# MODEL AIRPLANE NEWS

*9th Year of Publication*

**NOVEMBER**

**1937**

**20c**

**U. S. Navy Sikorsky Flying Dreadnought**

# MEGOW'S *Latest*


**AERONCA K**

A new development of the famous Aeronca C-3. In place of the old wire bracing, wing struts are now used.

**ARROW SPORT V-8**

An authentic detailed model of an outstanding light Ford V-8 powered sport plane.

**Large 30 in. Wingspan Fliers and Exact ½ in. Scale Detail Models** **50¢** (Postage 10c ex.)

**MISS STRATOSPHERE**

Exact ½ in. scale model kit of Col. Clarence Chamberlain's high altitude ship, introducing a new type of construction with wood veneer as a covering.

**60c,** *postage 10c extra*

**GASOLINE MOTORS!**

**New BROWN Jr.**
**$21.50**

**SYNCRO ACE**
**$15.00**

**MORTON CHALLENGER**
**$13.95**

**Full line of Gas Motor Supplies**

**Other Megow HEADLINERS**

**Quaker Flash** **$4.95** Postage 30c ea.

Outstanding among all gas-powered models. Large, but folds to carry in car. Easy-to-follow plans. Uses any model airplane motor. 3¼" rubber wheels, well forward for safe landings. Wingspan 67 in. Length, 47 in.

**BUILD YOUR OWN SHIP MODELS!**

Megow ship models include easy-to-follow plans and all materials. Dozens of types such as the BOUNTY, SETH PARKER, SANTA MARIA, QUEEN MARY, yachts, etc., from 10c to $6.00. Clipper ship GREAT REPUBLIC. $1.25 plus 15c postage.

**Al Williams' Famous GULFHAWK**

A new model kit of the famous Grumman. Duplicate of the latest navy fighting plane, plus new features added by Major Williams.

**50c,** *postage 10c extra*

Additional models have been added to Megow's new Fall line announced recently. More large wingspan flying models, and more ½ inch scale detail models . . . and of today's most famous ships, too! Graceful, light and colorful, they give the builder something to be proud of . . . and yet so easy to build!

These models in this wonderful new line bear famous names, and are sponsored by famous aviators . . . . Al Williams, Clarence Chamberlain and others.

Megow models are available in scores of kinds and sizes from small solid designs up to giant fliers and gas-powered models.

Ask your dealer to show you the new models shown here, or use the coupon for ordering direct from us, if he cannot supply you. The coupon with 5c postage will also bring you the latest Megow catalog showing scores of world-famous airplanes and boats.

**DEALERS:** **Write for information on this new line . . . and ask about the new Megow Prize Contest Plan.**

## MEGOW'S

Dept. MA., Howard & Oxford Sts.
Philadelphia, Pa.

Chicago: Dept. MA., 217 N. Desplaines St.

***Use this Coupon for Ordering or Requesting Catalog!***

MEGOW'S, Dept. MA., Howard & Oxford Sts., Philadelphia, Pa.

Please send me

( ) AERONCA K
( ) GULFHAWK
( ) MISS STRATOSPHERE
( ) MONOCOUPE
( ) TAYLOR CUB
( ) STINSON RELIANT
( ) ARROW SPORT V-8

Money Order for..... is enclosed.

( ) If you want a catalog, enclose 5c and check here.

Name .....

Address .....

City ..... State .....

# BABY CYCLONE

## THE BIGGEST NAME IN LITTLE ENGINES

## WORLD'S CHAMPION


Only

**$12.50**

POSTPAID ANYWHERE IN U.S.A.
NOW SOLD ONLY
DIRECT FROM FACTORY TO YOU!
The Most Expensive Engine at the Cheapest Price

## Baby Cyclone is the Best in the World
## Own only the best—buy the World's Champion

*Proven!* **"THE BIGGEST NAME IN LITTLE ENGINES"**

On July 10, 1937, a Baby Cyclone Engine at the National Gas Model Meet held at Detroit, Michigan, won the meet and set a new National Record of one hour, ten minutes and two seconds. Baby Cyclone Engines had also won, on May 6, the 1937 National Championship of France at one hour and twenty minutes and the National Championship of Germany, at one hour and eight minutes—a record unsurpassed by any other miniature engine in the world . . . *"The Baby Cyclone is Truely a World's Champion."*

**"The Most Expensive Engine at the Cheapest Price"**

### Sensational Features of the Baby Cyclone "E"

Larger and more efficient Dural cooling fins on cylinder ★ Finned Dural cooling-head reducing head temperature 25% to 30%, thus increasing engine efficiency ★ New 2 oz. capacity streamlined steel tank with new, convenient large 9/16 in. filler cap ★ Funnel sump so your tank will be good to last the drop ★ Engine is mounted on a drawn steel engine mount with fuel tank integral ★ After exhaustive tests we have found this steel mount to be far superior than any other type. It is very light in weight, extremely rigid and easily installed or adapted to your ships ★ Port timing is of the fastest and most powerful known today. Engine turns 6000 R. P. M. with prop. ★ Side exhaust stack for simplicity and cleanliness inside engine cowling ★ Finer precision workmanship and materials throughout.

**OTHER FEATURES**

Adjustable Spark ★ High Speed Main Bearing ★ Rotary Crank Shaft Valve ★ Special Baby Cyclone Spark Coil.

The Baby Cyclone is the most reliable engine in the world today. It is manufactured by a reliable concern. You can always depend on your BABY CYCLONE.

REFERENCE, LOS ANGELES CHAMBER OF COMMERCE

**A BETTER ENGINE FOR LESS MONEY...**

***HERE'S HOW WE DO IT.***

High precision skilled workmanship, expensive, materials and rigid test inspection required in its manufacture, now make the improved Baby Cyclone more expensive to build. With dealer's discount added, this engine could only be sold for $25.00. Instead Aircraft Industries now sells *only direct from factory to user* thus passing the dealer's discount on to you as a big saving . . . Buy Direct from Factory! Use the order blank right now!

**"CYCLONE SERVICE" . . . Your Engine Will Be Shipped Same Day Order is Received.**

## AIRCRAFT INDUSTRIES

GRAND CENTRAL AIR TERMINAL
GLENDALE (LOS ANGELES) CALIF.

C. C. MOSELEY, President, Aircraft Industries, Grand Central Air Terminal, Glendale, California

*Sir: Please send me postpaid the following items checked. I enclose Post Office money order.*

◯ **BABY CYCLONE ENGINE MODEL "E" only... $12.50**

◯ California "Champ" Kit, Complete, $10.00 ◯ California "Chief" Kit, Complete, $7.90 ◯ Hardwood Propeller, $1.50

◯ **COMBINATION "Champ" Kit, prop. and engine, $17.85** ◯ **COMBINATION, "Chief" Kit, prop. and engine, $15.75**

N-11

SHIP TO_____ Age_____ ADDRESS_____

# Model AIRPLANE News

9th YEAR OF PUBLICATION

*VOL. XVII* *No. 5*

*Edited by Charles Hampson Grant*

## CONTENTS

NOVEMBER, 1937



**IN OUR NEXT ISSUE**

Look For Interesting and Enlightening Articles on All Phases of Model Aviation

Published Monthly by JAY PUBLISHING CORP., Mount Morris, Illinois.
Editorial and General Offices, 551 Fifth Avenue, New York City.
George C. Johnson, President. Jay P. Cleveland, Secretary.
Jay P. Cleveland, Advertising Manager, 551 Fifth Avenue, New York, N. Y.
Entered as second-class matter Dec. 6, 1934, at the post office at Mount Morris, Ill., under the act of March 3, 1879. Additional entry at New York, N. Y.

Price 20c a copy. Subscription price $1.65 a year in the United States and its possessions; also Cuba, Mexico and Panama.
$1.65 in Canada. All other countries $2.50 per year.

The NEW 1938 "Custom Cavalier," The Aristocrat of Model Airplanes. 9 ft. wingspan—simplified MONOCOQUE CONSTRUCTION—for 1/6 to 1/3 h.p.

The new "Custom Cavalier" is, without doubt, the most beautiful and durable model airplane produced. On test flights, with only a minute motor run, this plane glided over 30 minutes!

Kit, including all materials to build the "Custom Cavalier," with full size plans and printed balsa parts; QUART Cans of cement; clear and colored dope; silk for covering; all ignition accessories, except wheels and power plant..... **$15.00** postpaid in U.S.A.

COMBINATION PRICE: Complete kit, with 9½" M & M Wheels, laminated propeller and Model "C" Brown Jr. Motor....**$33.00**

# Berkeley's 1938 "Custom Cavalier" Paces the Field


## The FOLKERT'S "SPECIAL"

America's No. 1 Racing Plane. Flown by Harold Newmann at the National Air Races. 1" 1 ft. scale. 16" wingspan. 20⅝" overall length featuring the new "Automatic Model Pilot," the only new idea in rubber-powered models, and the nearest thing to radio control. Flies 40 m. p. h. As the power dies, the flaps lower, the landing gear drops and the plane glides in for a perfect landing.

"Automatic Model Pilot" is a copyrighted Berkeley design, obtained only in the Folkert's' kit. Kit is complete with large detailed plans and printed wood. Price, **$1.50** P. P. in U.S.A.

## FEATURES FOUND EXCLUSIVELY IN BERKELEY GAS MODELS

1. Every Berkeley Gas Model is developed from a series of similar models.
2. Every Berkeley Gas Model must pass a rigid structural and flight test before being sold on the market.
3. All Berkeley models are designed by Berkeley, the oldest commercial gas model company in the country. These designs cannot be obtained elsewhere under any other name.
4. Every kit is custom assembled. We can supply you with whatever color dopes you wish. Simply specify the color.
5. Every kit includes aircraft ignition cable, toggle switch, nuts and bolts, metal fittings, solder, etc.
6. Every kit has full-size plans with structural drawings for clearness, all ribs and bulkheads printed on balsa and a complete list of materials so that you can check the contents of the kit.
7. Every model shows the installation of the Model "B" or "C" Brown Jr. Motor with instructions for installing other engines of the recommended horsepower.

GAS MODEL PLANS. Complete Full size plans as included in kit, with instructions and bill of materials. "Buccaneer Standard", **$1.00** P.P. "Super-Buccaneer", **$1.50** P.P. "Custom-Cavalier", **$2.50** P.P.

NEW CATALOG. Ready October 15th. Including many new items and three-view drawings of gas models. Your copy will be mailed, if you are on our list, as soon as it comes off the press. If you are not on our list, send 10c in stamps for your copy.

### DEALERS AND CLUBS

Berkeley has the largest range in both price and size in the gas model field. Write today for details of our new dealer and club organization.

BUCCANEER

**NOW!!**

BROWN JR MOTOR

### IN TWO MODELS

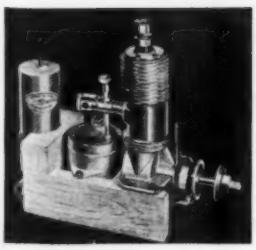
Both have ¼" Bore & 1" Stroke and are of similar external appearance.

**Model "B"**—With fitted steel piston, for contest work. **$21.50** POSTPAID

**Model "C"**—with a dependable alloy piston and iron rings; suitable for long use at low cost. **$17.00** POSTPAID

FREE—14" Mahogany Propeller with every Brown Jr. Motor.

We will accept your old motor in trade, regardless of condition or make, as part payment on either a new Model "B" or "C" Brown Jr. Motor. Write for details, stating make and model of your old motor. We have a ready market for your used engine and we can give you an exceptionally reasonable allowance.



### The NEW "BUCCANEER-STANDARD"

5½' wingspan—¼ to ⅓ h.p. Here's a plane that will outdo any seven-footer on the market. Made of usual rigid Berkeley construction. Vibration and sharp banking under power have been eliminated. Construction is so simple that even a beginner can build the ship in a few days. Kit is just as complete as any of our large size models, including full size plans; printed ribs and bulkheads; large can of cement and three colors of dope. Complete kit, less wheels and power plant, **$5.00** P.P. in U.S.A. COMBINATION PRICE: "Buccaneer-Standard" with 3½" M. & M. Air Wheels; Model "C" Brown Jr. Motor and Propeller, **$24.00.**

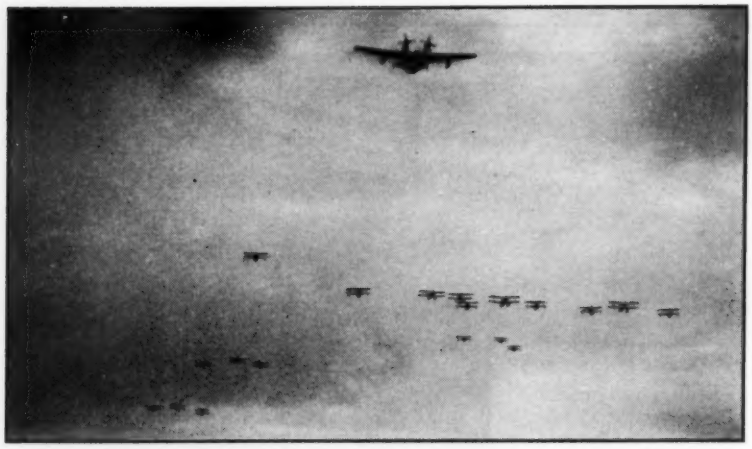
## BERKELEY MODEL SUPPLIES

"FIRST IN GAS MODELS"

**53 Berkeley Place Dept. U-30 Brooklyn, N. Y.**

# The Orient Takes To The Air

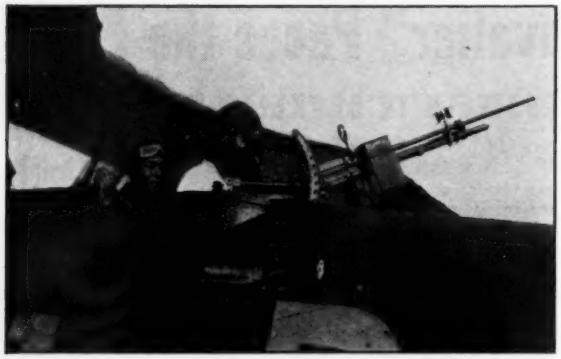
## Some Enlightening Facts Which Show the Relative Standing of the Air Forces of China and Japan and Problems They Have to Meet



Jap. planes in formation flight at a Grand Naval Review *(International)*

By FLETCHER PRATT

SO MANY things have been going on so rapidly at Shanghai that no one will know all the details for months to come, and even the partial information now available leads to pretty complicated stuff. The Chinese have bombed their own towns, their own people; the Japanese have bombed targets in sight from their gun positions which could have been knocked to pieces by artillery at far less cost; neither side has shown any enthusiasm for fighting in the air; when an airplane flies overhead nobody in this strange war knows whom it belongs to.

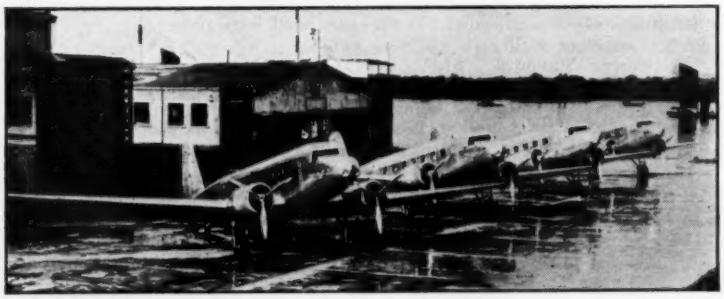


Jap. pilot and gunner ready for action. *(Acme)*

To understand how all these impossible things have come about we have to go back to the time when Chiang-Kai-Shek, nominally only the chief of a bureau controlling a small chunk of China, actually the dictator of most of that country, came into power. Chiang-Kai-Shek's wife was educated in the United States. She is an extremely intelligent woman, and among her acquaintances in this country numbered both Amelia Earhart and Anne Morrow Lindbergh. From them or from somewhere she became an enthusiast for aviation; the more she studied it the more she became convinced that it was the key to the development of China.

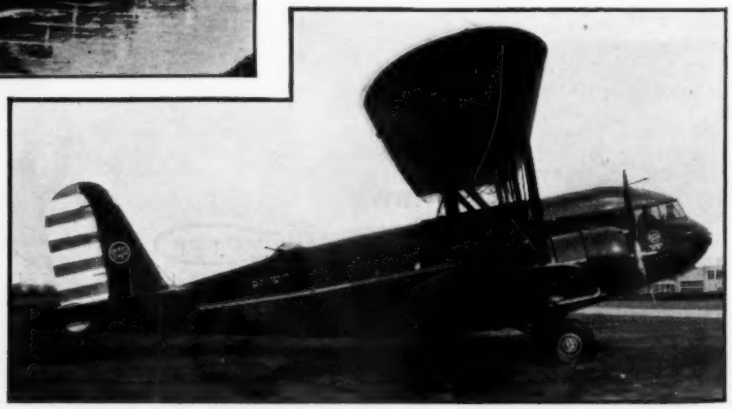
Two things hold up the advance of her country; the lack of good roads and railroads, and Japan's continual warlike pressure. In aviation she saw a method of communication far quicker and less expensive than any other for the vast spaces of China. In an air service she saw a means of defence against Japan which could be built up with relative speed, compared to the amount of time necessary for founding a big army or the huge industrial plant needed for setting up a navy.

She persuaded her husband of the importance of the air. Between them they persuaded the Central Chinese government; and shortly after Japan bit off the chunk of northern China which was erected into the independent state of Manchukuo, the two Chiangs got in touch with Pan-



Four Douglas transports at the Nanking Airport, recently converted into Chinese bombers. *(Monkmeyer)*

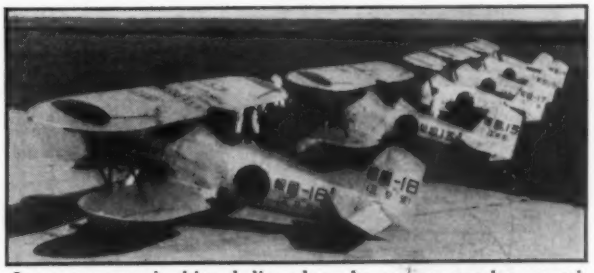
A Curtiss Condor carrying eighteen 100 lb. bombs in China. Two 1100 lb. bombs are in the fuselage



A Curtiss Condor taken to China by Frank Hawks. This plane boasts of machine-gun nests in the nose and near the tail. It may be used as a bomber or troop ship

A group of student pilots in China. *(Soibelman)*

Curtiss "Hawks" given to Gen. Chiang-Kai-Shek. *(Univ. Newsreel)*



Jap. navy pursuit ships dedicated to the government by a patriotic widow, Mrs. Teiko Metani. Six were given also to the army. *(Acme)*

A squadron of modern Japanese two-motored bombers, a combination of German and French design

American Airways. Pan-American was then already considering a trans-Pacific air line, and the prospect of China-American cooperation was too good to be missed. They helped the Chiangs to make a series of arrangements.

The first was for the formation of a regular commercial air service in China, mostly among the great cities of the coast, with feeder lines running back into the country, and a prospect of expansion as soon as these were on a paying basis. The company running this air service was called the China National; Pan-American controlled 45% of its stock and furnished American pilots and American planes, with the understanding that on every trip one or more Chinese student pilots would be carried, and gradually trained as co-pilots. A second arrangement was for several classes of young Chinese to be trained as pilots in the United States. A third called for an American air mission to go to China under Col. J. H. Jouett; this mission was to train young Chinese as aviators at one end, and at the same time to found an aircraft factory at Chien Chiao, where more Chinese would be trained as mechanics, airplane builders and airplane designers.

The last of these contracts ran for a three-year period; at the end of that time the Chinese were to take over the factory, and it was expected that by that time the Chinese military aviators would be far enough along to train their future recruits.

These agreements had not been signed very long before news of them got around, and the Italians, itching for foreign contacts and foreign markets, offered to send another air mission on terms even more advantageous than those negotiated with the Americans. After some delay the Chiangs accepted their mission also. A new factory and training field was established at Nanchang and a number of Italian airplanes were sent out. Then the English and Germans came along, but by this time the Chiangs felt they could not handle any more special missions, so both these nations got in with commercial air lines, partly Chinese owned, and with young Chinese making every trip for training as pilots, as in the case of China National. The German outfit was called Eurasia Air Lines and the British, the South-Western Chinese Air line.

Before we go any further it is important to understand two things. The first is that this competition among Americans, English, Germans and Italians has given the young Chinese air force a strange assortment of types, ships so different that a Chinese pilot trained in one school practically has to learn his business all over again when he changes to a plane of different type belonging to his country. The second thing is the report brought back by every one of the foreign aviators who has tried instructing these Chinese boys. They praise the young aviators' intelligence, their spirit, their quickness, but—

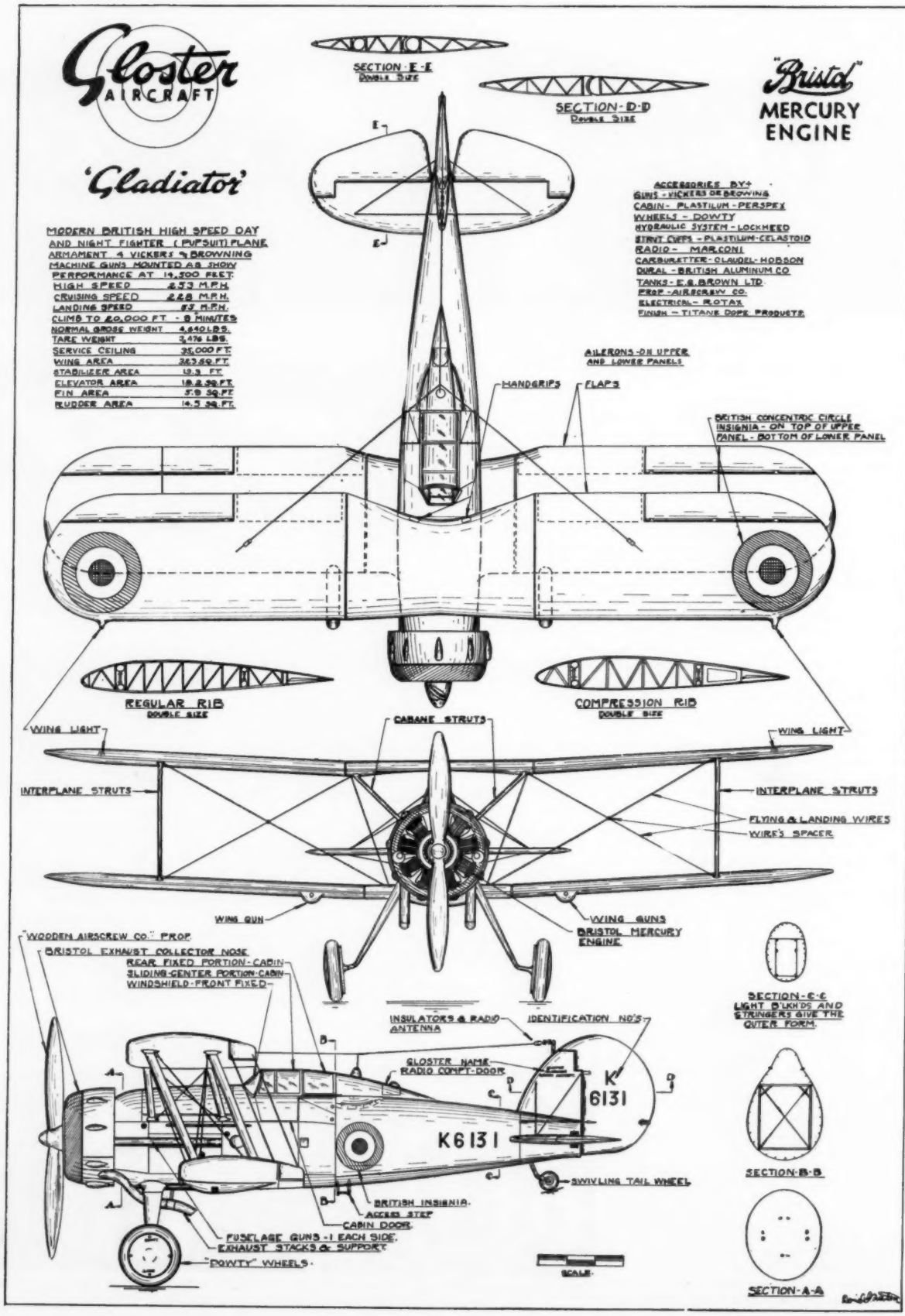
"When one of 'em gets in a spin, instead of trying to pull out, he folds his hands across his stomach, says, 'Oh, the jewel of the lotus!' and waits for her to flop."

That is, the Chinese are fatalists. They are willing to fight right to the finish, but they don't expect to win; don't care much about human life, their own or anybody else's. Most of them are not too good as pilots, either; they don't have enough air hours and have not faced anti-aircraft guns or hostile planes; they have not done much bombing.

Once these facts are understood the explanation of the Chinese dropping bombs apparently at random becomes clearer. The Japs have landed in Chinese territory. The Chinese aviators are out to get them, they sometimes miss, and besides, if they

*(Continued on page 42)*

Two new planes that were given to the Jap. government by the people of Japan; one a two motored bomber, the other a hospital plane. *(Acme)*


Gloster AIRCRAFT
'Gladiator'
"Bristol" MERCURY ENGINE
MODERN BRITISH HIGH SPEED DAY AND NIGHT FIGHTER (PURSUIT) PLANE.
ARMAMENT 4 VICKERS & BROWNING MACHINE GUNS MOUNTED AS SHOWN
PERFORMANCE AT 14,500 FEET
HIGH SPEED 253 M.P.H.
CRUISING SPEED 228 M.P.H.
LANDING SPEED 57 M.P.H.
CLIMB TO 20,000 FT. - 8 MINUTES
NORMAL GROSS WEIGHT 4,640 LBS.
TARE WEIGHT 3,476 LBS.
SERVICE CEILING 35,000 FT.
WING AREA 323.69 FT.
STABILIZER AREA 13.3 FT.
ELEVATOR AREA 18.2.39 FT.
FIN AREA 5.9 SQ.FT.
RUDDER AREA 14.5 SQ.FT.
ACCESSORIES BY:-
GUNS - VICKERS OR BROWNING
CABIN - PLASTILUM - PERSPEX
WHEELS - DOWTY
HYDRAULIC SYSTEM - LOCKHEED
STRUT CUPS - PLASTILUM-CELASTOID
RADIO - MARCONI
CARBURETTER - CLAUDEL-HOBSON
DURAL - BRITISH ALUMINUM CO
TANKS - E.G. BROWN LTD.
PROP - AIRSCREW CO.
ELECTRICAL - ROTAX
FINISH - TITANE DOPE PRODUCTS
SECTION-E-E DOUBLE SIZE
SECTION-D-D DOUBLE SIZE
AILERONS-ON UPPER AND LOWER PANELS
HANDGRIPS
FLAPS
BRITISH CONCENTRIC CIRCLE INSIGNIA - ON TOP OF UPPER PANEL - BOTTOM OF LOWER PANEL
REGULAR RIB DOUBLE SIZE
COMPRESSION RIB DOUBLE SIZE
WING LIGHT
CABANE STRUTS
INTERPLANE STRUTS
FLYING & LANDING WIRES
WIRE'S SPACER
WING GUN
WING GUNS
BRISTOL MERCURY ENGINE
"WOODEN AIRSCREW CO." PROP
BRISTOL EXHAUST COLLECTOR NOSE
REAR FIXED PORTION-CABIN
SLIDING-CENTER PORTION-CABIN
WINDSHIELD-FRONT FIXED
INSULATORS & RADIO ANTENNA
IDENTIFICATION NO'S
GLOSTER NAME
RADIO COMPT-DOOR
K 6131
SWIVLING TAIL WHEEL
BRITISH INSIGNIA.
ACCESS STEP
CABIN DOOR
FUSELAGE GUNS - 1 EACH SIDE.
EXHAUST STACKS & SUPPORT
"DOWTY" WHEELS.
SCALE-
SECTION-C-C LIGHT BULKHDS AND STRINGERS GIVE THE OUTER FORM.
SECTION-B-B
SECTION-A-A

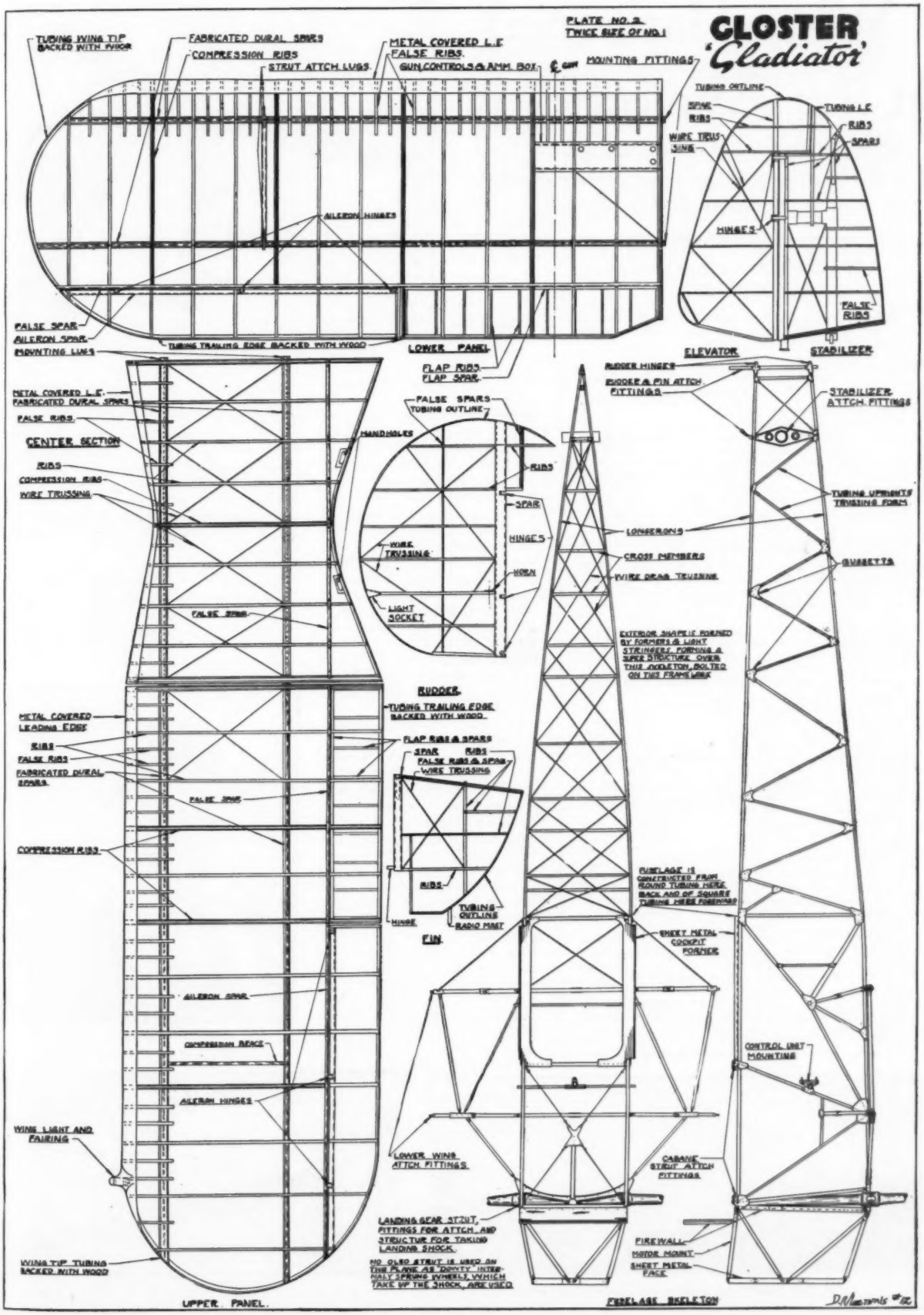


PLATE NO. 2.
TWICE SIZE OF NO. 1
GLOSTER
'Gladiator'
TUBING WING TIP BACKED WITH WOOD
FABRICATED DURAL SPARS
COMPRESSION RIBS
STRUT ATTCH. LUGS.
METAL COVERED L.E.
FALSE RIBS.
GUN CONTROLS & AMM. BOX
MOUNTING FITTINGS
AILERON HINGES
FALSE SPAR
AILERON SPAR
MOUNTING LUGS
TUBING TRAILING EDGE BACKED WITH WOOD
LOWER PANEL
FLAP RIBS
FLAP SPAR
TUBING OUTLINE
SPAR
RIBS
WIRE TRUSS
TUBING L.E.
RIBS
SPARS
HINGES
FALSE RIBS
ELEVATOR
STABILIZER
METAL COVERED L.E.
FABRICATED DURAL SPARS
FALSE RIBS.
CENTER SECTION
RIBS
COMPRESSION RIBS
WIRE TRUSSING
FALSE SPAR
FALSE SPARS
TUBING OUTLINE
HANDHOLES
RIBS
SPAR
HINGES
WIRE TRUSSING
HORN
LIGHT SOCKET
RUDDER HINGES
RUDDER & FIN ATTCH. FITTINGS
STABILIZER ATTCH. FITTINGS
TUBING UPRIGHTS TRUSSING FORM
LONGERONS
CROSS MEMBERS
WIRE DRAG TRUSSING
GUSSETTS
EXTERIOR SHAPE IS FORMED BY FORMERS & LIGHT STRINGERS FORMING A SKIN STRUCTURE OVER THIS SKELETON, BOLTED ON THIS FRAMEWORK
RUDDER.
TUBING TRAILING EDGE BACKED WITH WOOD
METAL COVERED LEADING EDGE
RIBS
FALSE RIBS
FABRICATED DURAL SPARS
FALSE SPAR
FLAP RIBS & SPARS
SPAR
RIBS
FALSE RIBS & SPAR
WIRE TRUSSING
COMPRESSION RIBS
RIBS
TUBING OUTLINE
RADIO MAST
HINGE
FIN.
FUSELAGE IS CONSTRUCTED FROM ROUND TUBING HERE, BACK AND OF SQUARE TUBING HERE FORWARD
SHEET METAL COCKPIT FORMER
AILERON SPAR
COMPRESSION BRACE
AILERON HINGES
CONTROL UNIT MOUNTING
WING LIGHT AND FAIRING
LOWER WING ATTCH. FITTINGS
CABANE STRUT ATTCH. FITTINGS
LANDING GEAR STRUT, FITTINGS FOR ATTCH. AND STRUCTURE FOR TAKING LANDING SHOCK.
NO OLEO STRUT IS USED ON THIS PLANE AS DIRECTLY INTERNALLY SPRUNG WHEELS WHICH TAKE UP THE SHOCK, ARE USED
FIREWALL
MOTOR MOUNT
SHEET METAL FACE
WING TIP TUBING BACKED WITH WOOD
UPPER PANEL.
FUSELAGE SKELETON

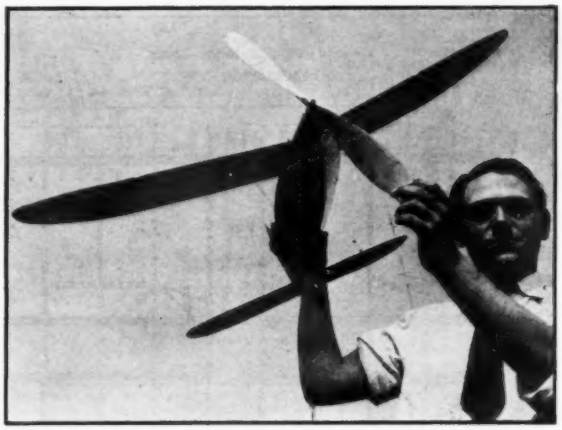
# What Happened at the "Wakefields"

## An Intimate Account of the Excitement That Reigned Among Fliers From Many Countries at the International Classic

By FRANK ZAIC

### 1937 WAKEFIELD INTERNATIONAL COMPETITION

*"Where Eleven Nations met in a rivalry which was pure enthusiasm and good will."*—Lord Wakefield



Emanuel Fillon of France winner of the international contest and Wakefield Cup

Wakefield House,
Cheapside, London, E.C. 2.
29th July, 1937.

Dear Mr. President,

I very much regret that I am prevented from being present at the banquet in honour of the competitors for the International Trophy which bears my name. It would have been a great pleasure to join with you as President of the Society of Model Aeronautical Engineers in welcoming our guests from so many different parts of the world, and I know that you will on my behalf tell them how delighted we are to do so.

It is not the least of the pleasures associated with the British victory in 1936 to be able now to offer some return for the splendid hospitality that has been shown to British teams competing for the Wakefield Trophy in previous years. We rejoice particularly in the presence of American contestants, for the abounding kindness of our American hosts last year will long be remembered.

I write before the event and thus can have no knowledge of the result of this year's competition. What is quite certain is that, whatever the result, it will be accepted in a spirit of true sportsmanship, and all concerned will join in warmest congratulations to the victors.

As you know, I have been interested in model aeronautical engineering from its early days, and I rejoice that the movement has spread far and wide. It is a science as well as a sport. Its practical value is everywhere recognized, proof being afforded by the fact that many of the early enthusiasts in model construction have since become famous designers and builders of the model aeroplane. Some of the younger competitors—and I remember that the British team last year included some who were very young—may well prove to be leaders in this great industry ten or twenty years hence. I hope they will not have forgotten the friendships and kindnesses engendered by these competitions, where twelve or more nations meet in a rivalry which is pure enthusiasm and goodwill. In this respect the world-wide model aeronautical movement has a value and importance which we shall do well to prize and preserve.

And now, Mr. President, may I thank you and Mrs. Thurston for so kindly and graciously acting as hosts to our many guests, and may I also convey through you my warmest wishes for a most enjoyable evening.

Yours very sincerely,
WAKEFIELD OF HYTHE.

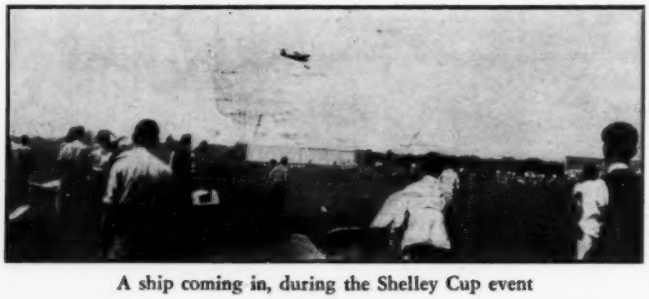
Dr. A. P. Thurston, D.Sc., M.I. Mech. E., F.R.Ae.S.,
President,
Society of Model Aeronautical Engineers.

THE 1937 Wakefield Competition was an occasion we who were present shall remember as one of our brightest and happiest moments. The friendly atmosphere, fine sportsmanship and numerous invitations to visit one and all just fairly did things to our emotions. If we could only duplicate many such international competitions where barrier of language is hurdled by sketches on paper, and where brute force is not pitted against brute force but rather skill and a bit of good luck determines the winner, then we can safely disband the League of Nations and substitute for it the International League of Model Aeronautics.

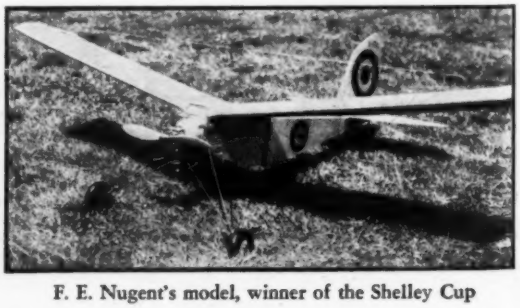
The meet was personally attended by 45 contestants from eight countries, and eleven models represented three more countries by proxy, making a total of 55 machines and eleven countries. The complete list of contestants, countries and final results is shown elsewhere. Besides the contestants themselves, the party was swelled by several observers from Continental Europe. These men are leaders in aviation or model builders of high reputation in their own country. The meet truly was International in every sense of the word, and indications show that next year in France we might have an even larger representation.

Just to give a description of the actual contest alone would be doing our English cousins an injustice. To my way of thinking they must have used this occasion as an excuse to show us one grand time. Their thoughtful hospitality began the moment a ship entered the harbor, or a train pulled into London, or a plane landed at Croydon. They actually had a special fund just to look after our welfare while we were in England as a group. They set us up in a comfortable boarding-house style hotel, so that our living expenses were very low indeed. They seemed to have a second sense in knowing just what we would like. We, of course, wanted a few days to ourselves to put models in shape and to talk about new surroundings. And that is exactly

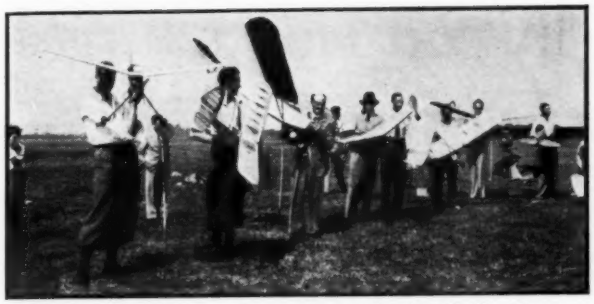
Herbert Fish, an American entrant from Akron, won the Bowden Trophy



A ship coming in, during the Shelley Cup event



F. E. Nugent's model, winner of the Shelley Cup



The line-up of gas model contestants for the Shelley Cup

In the American corner, Jessee Bieberman works on Struck's model. Dick Bodle, Herbert Fish (sitting), Alvie Dague (standing) are very busy

A. Van Wymersch of Belgium

what happened except that they went a step farther by providing us with cars to bring our models to a testing ground near London.

Those of you who attended the Nationals knew that it was doubtful if we would be able to send our team in person because the fund for the trip simply was not large enough. The writer was the only one who was certain of going, and it was decided at Detroit that he should take the models along with him. The sailing deadline arrived with only Alvie Dague's model on hand. To make sure we will have some sort of a representation yours truly hurriedly picked up Henry Struck's and his own ship. And during the voyage, the question was how to explain the circumstances to the Englishmen. So it really was a pleasant surprise to hear from Harry York that there were three other boys from America already in London.

It finally turned out that Herbert Fish and Dick Bodle from Akron were sent by the Akron Women's N.A.A. chapter. Herbert made a sort of a second honeymoon out of the trip by taking his better half with him. Alvie Dague came all the way from Tulsa on such a short notice that we all wondered how he managed it. He learned of his good fortune on the 22nd of July and he had to board the Europa on July 23rd. A jumble of telephone calls and telegrams straightened a rather complicated traveling procedure, and he was in New York on time by traveling the whole night on the plane, where he was handed his ticket and passport. With Mr. and Mrs. Jessee Bieberman scheduling their European tour for the Wakefield date, we totaled seven Americans.

The morning of the momentous day dawned or I should say fogged in the regulation London style, but even the weatherman was kind to us because by the time we arrived on the field and assembled our ships Old Sol was already peeping through the cracks in the clouds. It was not long before the sky was cleared and the sun was pouring on heat full blast. With the ground slightly moist from the dew, we knew we were in for regular Yankee flying weather. Although this condition was right up our alley, we wondered how the other contestants would fare. As the day turned out we were a bit backed down with our theory of one fast climb and then trust to glide. But that is getting a bit ahead. At about eleven we were set in our inclosure with a USA sign marking the spot. Dick, like a true patriot that he is, soon had the Stars and Stripes on it. Next we drew lots for flying order and we chanced third with France first.

The field set up was good. The enclosures formed a segment of a circle outside of which sat the spectators and where the public speaking system was set up. The spectators were very orderly and made themselves comfortable by sitting or lying on the lawn-like grass of the Fairey Aerodrome. The take-off board was placed at the center of this

*(Continued on page 60)*


C. S. Rushbrooke with Adam's Canadian entry

**SOCIETY OF MODEL AERONAUTICAL ENGINEERS. WAKEFIELD INTERNATIONAL COMPETITION, 1937**

**PROGRAM OF ARRANGEMENTS**

*Saturday, 31st July, 1937.*

Competitors will be met at Croydon and other places of arrival and handed this program.

*Sunday, 1st August, 1937.*

*9 a.m.* Foreign competitors will be conveyed from The Royal Aero Club, 119, Piccadilly, W. 1., to Fairey's Great West Aerodrome, Heath Row, West Drayton, Middlesex.

*11 a.m.* Wakefield International Competition commences. (Lunch boxes will be provided for foreign competitors.)

*7 p.m.* Return journey from the Aerodrome to Lyon's Corner House, Coventry Street, W., for an informal supper.

*9 p.m.* Supper.

*Monday, 2nd August, 1937.*

*9 a.m.* Buses leave The Royal Aero Club and convey foreign guests to Fairey's Aerodrome.

*11 a.m.* Sir John Shelley Cup Competition for Power-driven models of any type. (Lunch boxes will be provided for foreign guests.)

*2 p.m.* Bowden International Trophy for Power Models.

*4:30 p.m.* Buses leave for return journey to The Royal Aero Club.

*7:30 for*
*8 p.m.* Banquet given by Lord Wakefield, the President and Council of the S.M.A.E., at Park Lane Hotel, Piccadilly, W.1. Evening dress optional.

*Tuesday, 3rd August, 1937.*

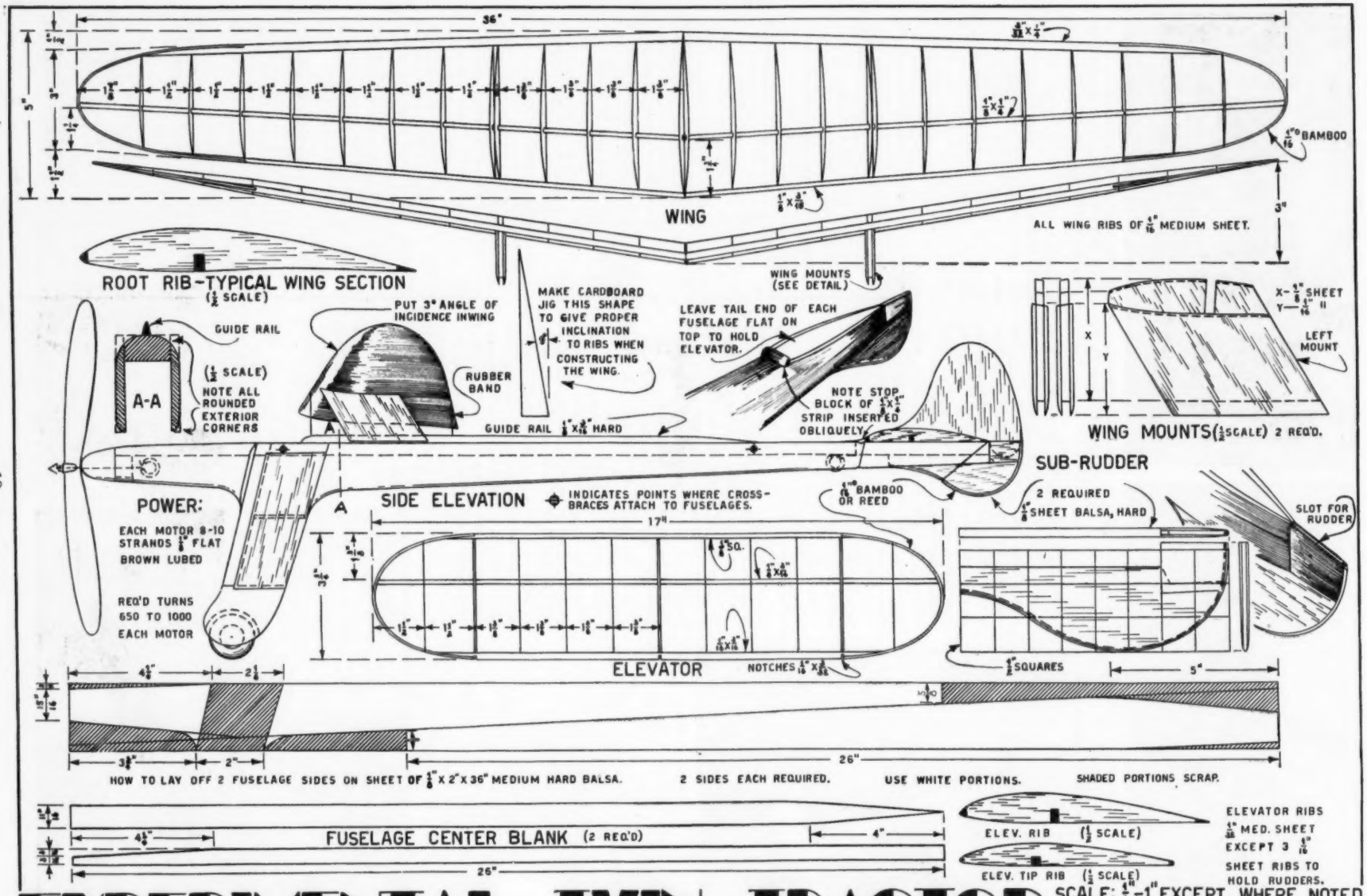
MORNING FREE.

*3 p.m.* Meet at The Royal Aero Club and proceed to South Kensington Science Museum.

*5 p.m.* Leave Museum.

*8 p.m.* Guests will be met at The Coliseum, St. Martin's Lane, Trafalgar Square, W.C.2., for performance commencing at 8:15 p.m.

Foreign guests may have communications addressed % The Royal Aero Club, 119, Piccadilly, W. 1.




# EXPERIMENTAL · TWIN · TRACTOR

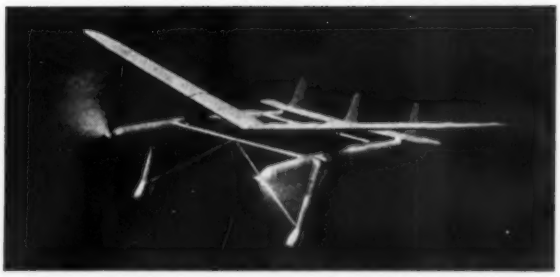
SCALE: 1/4"=1" EXCEPT WHERE NOTED

PLATE 1

ELX GUTMANN

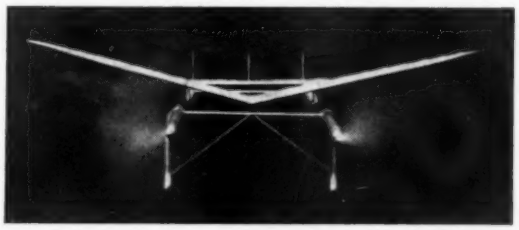
# An Experimental Twin Tractor

## One of the Most Unique and Finest Fliers Ever Presented. If You Want Something Different, Build and Fly This One



The model boasts of twin fuselages and three fins

By FELIX GUTMANN



A wide tread and twin props insure good takeoffs

HERE is a model that is different; an unusual type of airplane that will please every kind of builder. It is ideally suited as an all weather outdoor model, may be easily adapted to a contest or speed model and provides an interesting project for the advanced builder because of its many new constructional features.

Of all model types it is the twin tractor which ranks second to the single tractor fuselage model in stability and flying qualities. Not only does this twin tractor live up to that classification, but it could give an easy show-down to many a single fuselage model in both flying and appearance.

There can be no arguments as to the stability of this ship. The climb is very steep. It flies in a wide circle to the right. The glide is very flat though fast, due to the high wing loading which is slightly over 2 ounces per 50 square feet of wing area, enough for any contest, and yet the performance is outstanding considering this fact.

This model may justifiably be classed in the "super-streamline" category, since every possible way of eliminating parasite drag has been incorporated. Among the new and novel features of this ship are the landing gear construction, the wing mounting method including the wing clips, and the method of attaching the removable tail unit.

This twin tractor may be used as a basic design for some builders who may wish to develop something new from it, which undertaking may be a very interesting and valuable one.

The model in flight high over Central Park and some of New York's "Skyscrapers"

## CONSTRUCTION

### Wing

The area of the wing is 140 square inches. For those who wish to bring the model into the 150 square inch plus, or E class, it is suggested that the span be increased to 40 inches continuing the present taper to that span.

First cut all the ribs from $\frac{1}{16}$" medium sheet balsa. It would be a good idea to scale up the root rib shown in the plans to full size, and then cut a template. However, each model builder usually has his own pet method of executing this process so it will be left to his own ingenuity. The leading edge is $\frac{1}{8}$" x $\frac{1}{16}$" stock. The trailing edge is 3/32" x ¼", and the spar is $\frac{1}{8}$" x ¼". All of them are of hard balsa. The tips are of $\frac{1}{16}$" round bamboo. Before building the wing, scale up the plan to full scale. Cut a cardboard template as shown to be used as a guide in inclining the ribs 9 degrees from the vertical when gluing them in place. Be sure to have exactly $\frac{1}{8}$" spacing between the two sets of ribs which are to accommodate the wing mounts. When the wing halves are dry, glue them together, putting 3" dihedral in each wing half. While this is drying make two wing mounts as shown in the plan, one left and one right. They are cut from 2" sheet balsa at an angle and are not glued in place till after the wing is covered. When covering the wing, disregard the opening for the mounts. The slit of tissue is cut out after the wing is doped, only on bottom, the covering is left whole on the top. The mounts are then glued in place. Be sure they are perpendicular. To be sure that the wing has 3 degrees incidence make a cardboard template 6 inches long by ¾" at one end and 9/32" *wider* at the other end. Place the wing on a table so that it rests on the mounts, and holding the template vertically slide it under the wing parallel to the chord at a point where it won't lift the wing off the table. Right here adjust the wing so that the spar and the trailing edge touch the template and the wing will be true. All this to be done of course before the cement between the mounts and the wing has hardened.

The motors are enclosed but are easily wound

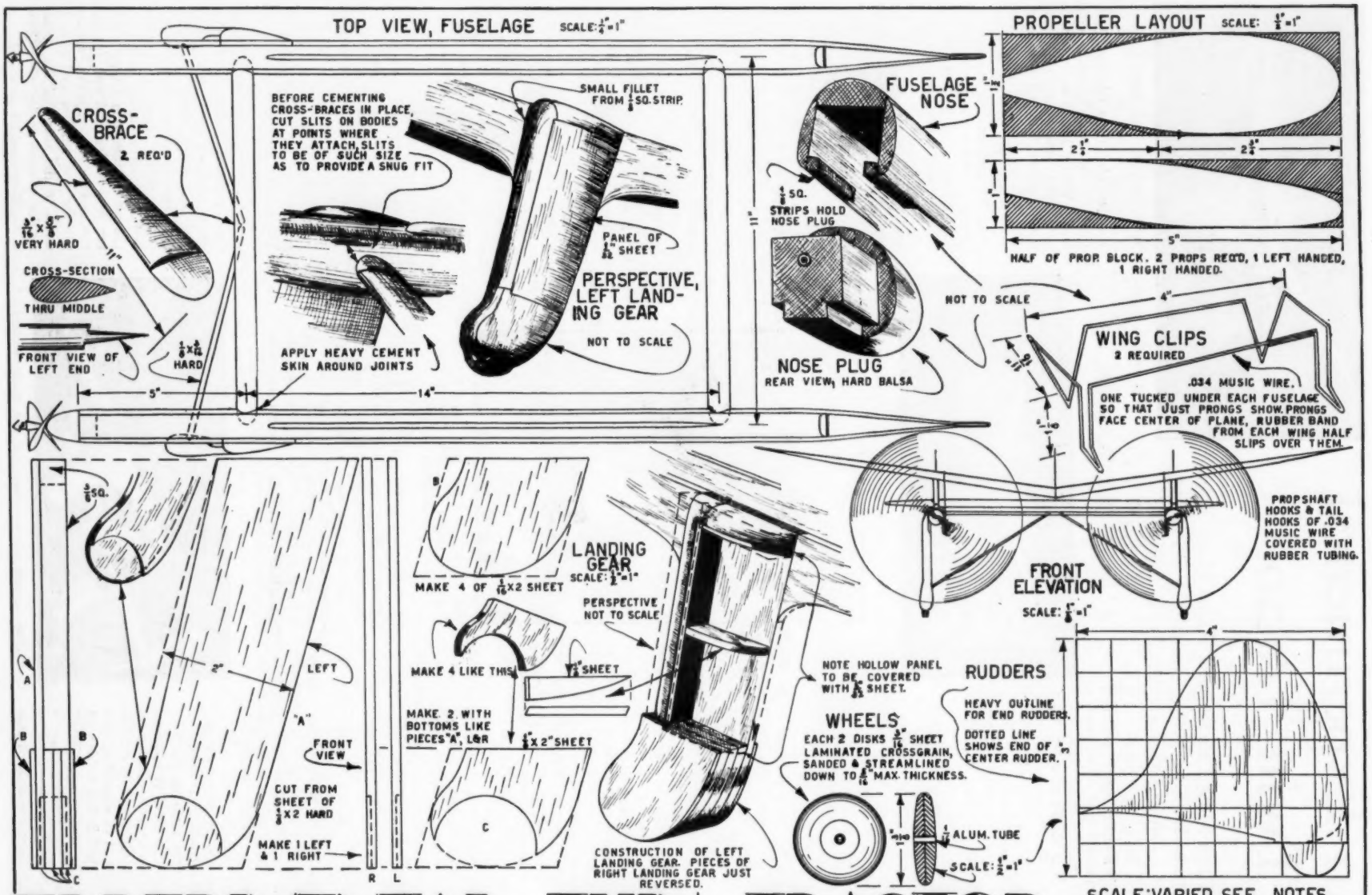
### Elevator

The elevator is very easy to build since there are only 2 types of ribs. There are nine main ribs and 2 tip ribs. (See bottom right of plate 1.) 3 of the main ribs are of $\frac{1}{16}$" sheet while all the rest of the ribs are 1/32" sheet medium. The $\frac{1}{16}$" sheet ribs are the ones to which the rudders are cemented. Note the $\frac{1}{16}$" x 3/32" notch back of each of these ribs. The rudders fit into each of these notches. The leading edge of the elevator is of $\frac{1}{8}$" sq. strip, the trailing edge of $\frac{1}{16}$" x $\frac{1}{16}$", and the spar of $\frac{1}{8}$" x $\frac{1}{16}$", all hard. The tip is of $\frac{1}{16}$" round bamboo or reed. The rudders are not cemented to the elevator till the latter is covered.

### Rudders

The rudders are cut from $\frac{1}{16}$" x 4" stock. The grain must run vertically. If no 4" stock is available, cement two pieces of $\frac{1}{16}$" x 2" sheet edge to edge. Cut cardboard templates of twice the size shown (3" x 4"). Make two and graph them with half inch squares. Draw lines through corresponding squares running through corresponding points on the plan. Make one template for the mid-rudder and one for the two end rudders, or make just one for the end rudders and trim it down to the shape of the center rudder as soon as the others have

*(Continued on page 45)*

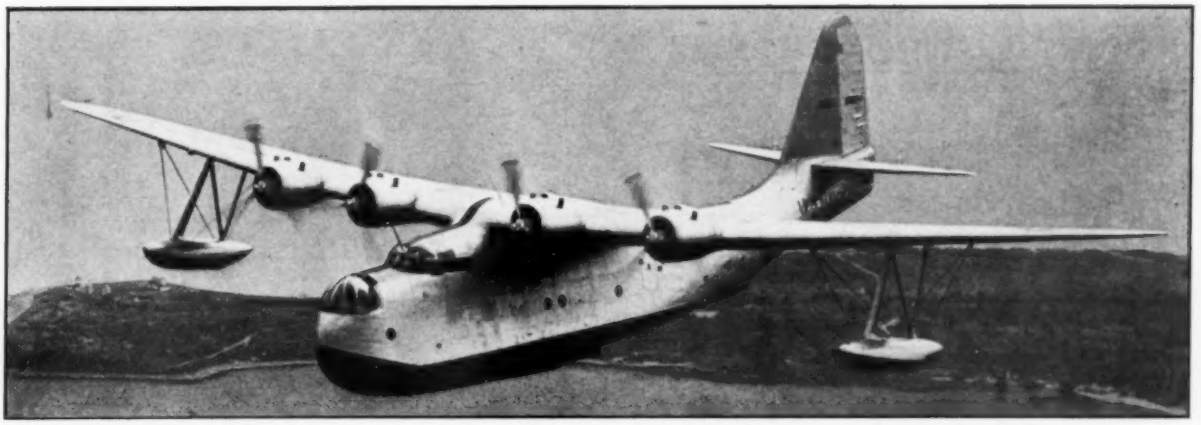



# EXPERIMENTAL · TWIN · TRACTOR

SCALE: VARIED, SEE NOTES

PLATE 2

FELIX GUIMAN



The new Sikorsky 55,000 lb. U.S. Navy air dreadnought, the world's most powerful seaplane *(Acme)*

# Frontiers of Aviation

## How Bombers May Be Destroyed and Highlights of the Latest Developments in Army, Navy and Commercial Planes—How to Build the Loiré-Nieuport Pursuit

By ROBERT C. MORRISON

NOW that the giant bombing plane has been created and perfected, the army is confronted with the problematic task of destroying it. Should some foreign nation develop huge four or six-engined bombers with speed and efficiency equal to ours, (though that is very unlikely to occur within the next five years) our designers would have difficulty in creating an airplane that would successfully combat the "flying fortresses." Present-day pursuit planes are too slow and do not have enough striking power to as much as annoy the crew in a bomber. A plane is needed with an enormous amount of power that will pull it up above the 30,000 foot level and give it a speed of about 350 m.p.h. With a couple of those new aircraft cannons in the nose it should be able to dive down on the bombers at terrific speed and pump as much lead into them before the bomber crew can exclaim "Zounds!"

The biggest problem is the power plant today. In order to "pile enough horsepower in one basket" two engines may have to be used. This of course increases the weight of an airplane tremendously and the wing span must be enlarged accordingly which makes a very big airplane even though only one man is carried. But a pursuit ship should be very small in order to be maneuvered quickly. There is a possibility, however, that by locating the engines, the pilot, fuel and armament as compactly as possible and increasing the wing loading to about 35 lbs. per square foot that an exceptionally fine pursuit plane may be developed. Of course as the engines consume the fuel the wing loading would decrease considerably and slow landings could therefore be made when tanks were almost empty. It might be that fuel will have to be dumped in order to lighten the load and make safe landings possible if the ship's fuel supply was not consumed on the flight.

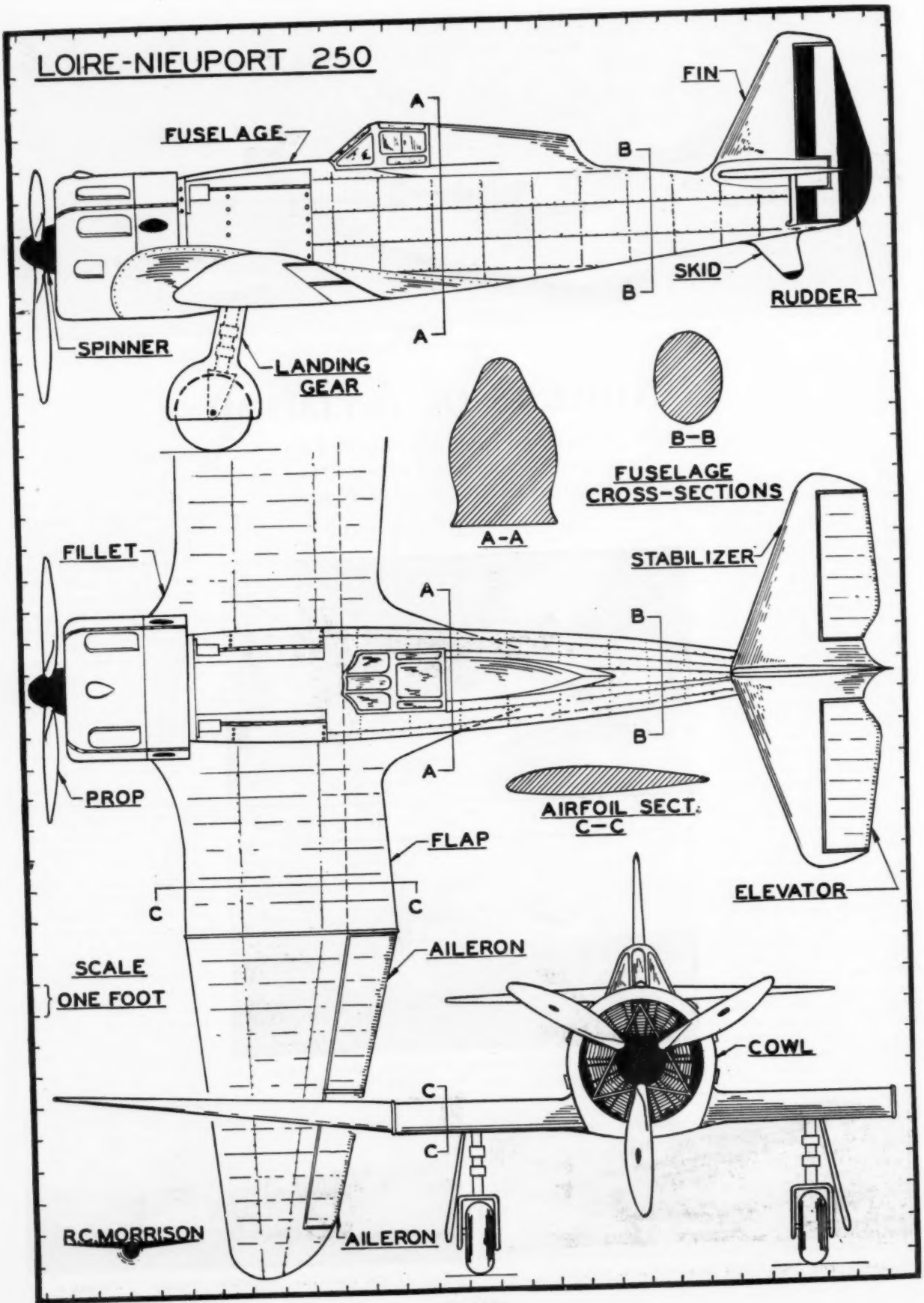
This surprise attack idea is not as simple as it seems, however, as it will not be easy to locate these big bombers when they are traveling at about 300 m.p.h., and when diving from above or below into a barrage of eight or nine spattering ma-

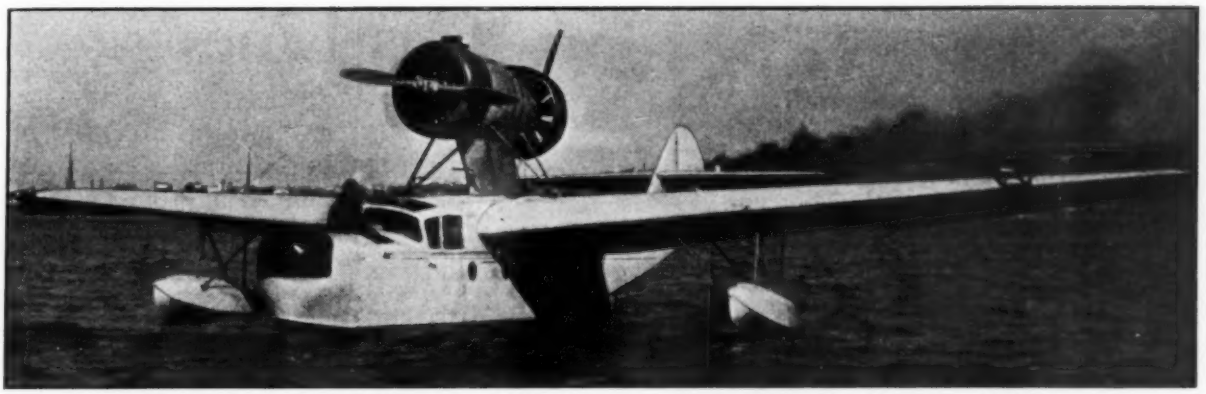

The Curtiss XSBC-3 with 650 hp. Twin Wasp Jr. *(Boisseau)*


The Fokker G-1. Note the unique design with gunners' nest in rear of the nacelle. Two "booms" support the tail

The Fokker 50-B bomber-fighter. *(Roona)*

17 ton trans-Atlantic German seaplane Nordmeer


LOIRE-NIEUPORT 250
FIN
FUSELAGE
A
B
B
A
SKID
RUDDER
SPINNER
LANDING GEAR
B-B
FUSELAGE CROSS-SECTIONS
A-A
FILLET
STABILIZER
A
B
B
A
PROP
AIRFOIL SECT. C-C
FLAP
ELEVATOR
C
C
AILERON
SCALE
ONE FOOT
COWL
C
C
R.C.MORRISON
AILERON



**The Russian seaplane ARK-3 that established a new international record in May 1937.** ***(Sovfoto)***

chine-guns the pursuit pilot may be "cooked" before he gets anywhere near his target. Though Richthofen attained most of his success by attacking the "belly" of the enemy ship, tactics are likely to be much different in the next big war.

The only other way to fight the bombers is to equip a fast ship with as many machine-guns as possible, go "out in the open," and have a heart-to-heart battle with them as two offensive battleships would do. The one that would send the other's crew wallowing in the bulkheads would be declared the winner. It would take two or three attackers perhaps to do a good "job" on a bomber. While two ships were whittling away the wing and draining the fuel supply with sizzling bullets the other could rake down the crew and make the entire ship in general look like the last word in moth-eaten draperies. Better yet, one touch of the bomber's magazine would send it into oblivion quicker than anything else, probably taking a couple of nearby attackers along with it. Even if the attackers were not entirely successful the racket they would create would detain the bombers somewhat and give the inhabitants of the city that is to be destroyed time to scamper to "other regions."

If a squadron of bombers once were started on a city there is no telling what damage might be done. With a series of two-ton bombs dropping from the air a town will not remain picturesque very long. A man leaning against a lamp post on 5th Ave. may in a few split seconds find himself up on the corner of 10th and Green St. sitting in a show window with a sewer plate wrapped around his waistline. So it is very necessary that a defensive nation must have equipment to fight these huge bombers.

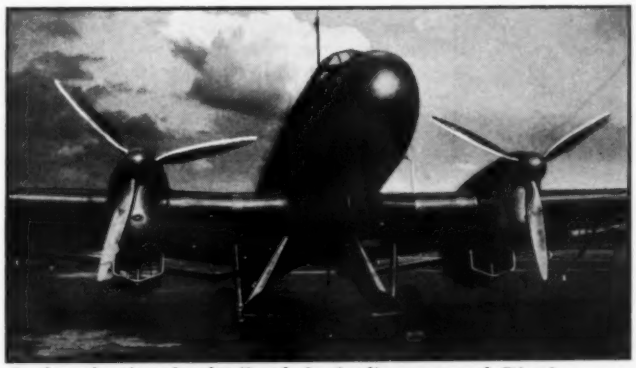
Boeing's thirteen bombers have been delivered to the Army Air Corps and now are constructing ten more with an option on still another three. This makes a total of 26 four-engined bombers ordered by the Army. With full loads it would not take them very long to lower New York City to the level of Jersey City. The total contract for the thirteen additional Boeings with spare parts amounts to $3,708,002.

It has been said that Douglas is seriously contemplating building a giant four-engined bomber with a wingspread of about 145-150 feet. This has been denied by Douglas engineers however.

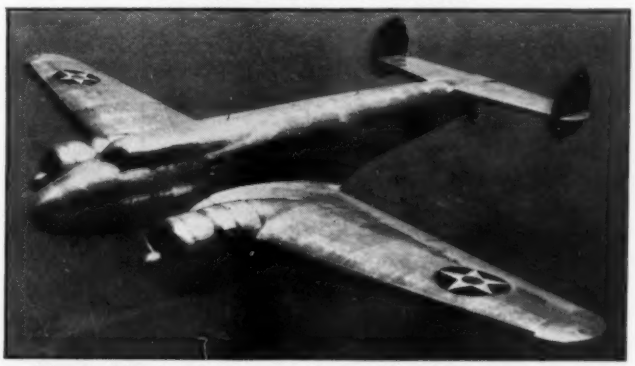
Though it has been rumored that twin-engined pursuits have been contemplated, one might perhaps be a Fairchild product, there has been no definite word of any such undertaking. However the Bell Aircraft Corp. of Buffalo has developed a wonderful fighter that may just be the answer to what the bomber needs as a good opponent. Much has already been written about the plane but we might sum up the facts here and perhaps add a little that has not already been said.

The ship is known as the Bell XFM-1 Army fighter. It is a twin-engined low-wing pusher monoplane carrying a crew of five, the pilot, co-pilot, radio operator and two gunners. There are

*(Continued on page 50)*



**A view showing the details of the landing gear and Diesel motors of the Junkers JU-86.** ***(Monkmeyer)***



**The Lockheed XC-35 stratosphere plane in flight.** ***(Acme)***


**Experimental Arup Flying Wing of 40 hp.** ***(Williams)***

**Lockheed 14 with Fowler type flaps. Lands at "47" m.p.h.**

# "Gas Lines"

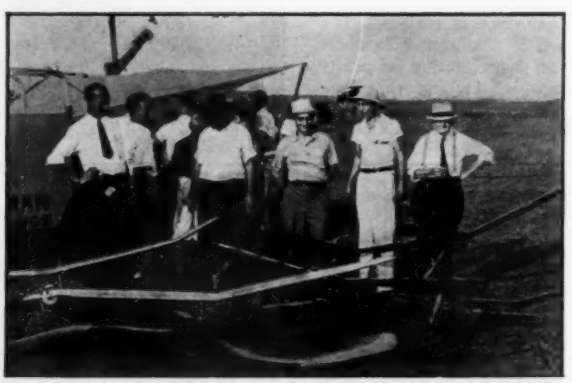
## Latest News of Members of the International Gas Model Airplane Assn. From All Parts of the World

Pict. No. 1. Secrets or—what? Boston fans getting the dirt —out of the Forester motor of Morris Sulkin's 12 ft. gas plane

Pict. No. 4. Cliff Cooper and his Aeronca K gas job

Pict. No. 5. A fine 68 inch gas job by Russell Smeed, just like a real plane

Pict. No. 10. A specially built trailer for 14 gas models built by the Quaker City Gas Model Club members



Pict. No. 11. Some members of the Quaker City Gas Model Club at the Allentown, Pa., contest. Gosh they're men!

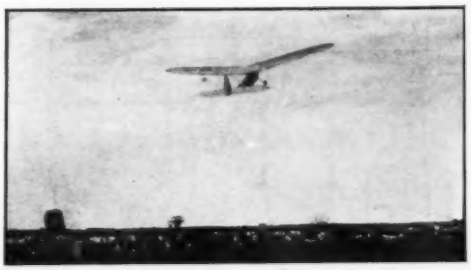
The I.G.M.A.A. Pin

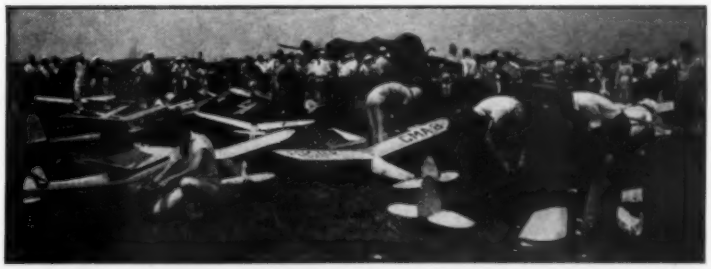
ALL has been rather quiet on the gas model front this past month except for a few repercussions of the ban against these little craft. It has already been announced that Massachusetts has banned the flying of gas models by anyone who has not a pilot's license. The state of Connecticut recently followed suit with such a ban. However we believe, from what we know of the situation, that the law banning gas model flights in Connecticut will not be enforced severely. In other words, gas model builders in Connecticut, we believe, may safely fly gas models if sufficient care is used not to incur the wrath of state authorities.

In other parts of the country activities have increased at a great rate. A large number of contests have been held. They were staged at: Akron, Harlem Airport in Chicago, St. Louis, Mo., Lafayette, La., and a number in California. In fact, a gas model contest is practically a weekly affair in this latter state.

With this increase in activity it is only logical that some form of regulation should be inaugurated. The I.G.M.A.A. might efficiently inaugurate such a program of regulation, but several personalities who have not been in favor of gas models have called attention to the fact that the I.G.M.A.A. is connected with a commercial organization. This is true, though this gas model organization has never used its connection to further its commercial needs. It appears, therefore, that gas model activities have to be regulated by some authoritative body which has international scope.

The logical organization to perform such an undertaking is the National Aeronautic Association. This organization is not only able to outline a regulatory program, but through its wide association is capable of carrying it out efficiently. The I.G.M.A.A., under the N.A.A., would command the attention of the many prominent and influential men in the avitation industry, inasmuch as these men are connected with the N.A.A. Without question gas model activities would expand immensely under their influence. Also, they would work to promote this activity under these conditions, rather than bring their influence into play to ban it, as certain state officials have done. In the near future, therefore, the I.G.M.A.A. will become a distinctive branch of the N.A.A. Negotiations are now taking place to have this brought about in an efficient manner. We hope that every I.G.M.A.A. member will show his real spirit in this thing and get behind this new set-up when it is officially announced. We feel that this is the strongest hand that can be played





Pict. No. 2 and No. 3. Views taken at the Chicago Aeronauts' Harlem Contest. Left: Melvin Yates' 14 ft. job takes the air. Right: in the "pits" at the Midwest Gas Meet, Chicago, Ill. Some crowd!

against those who wish to ban gas models.

Strange to say, one of the most active groups in the gas model field is in Boston, Mass., in a state which has banned gas models. Mr. Albert L. Lewis of 7 Kenneson Road, Somerville, Mass., and a director of the Boston Gas Model Society, is one of the most active gas model enthusiasts in his locality. He sends us picture No. 1 to show that boys in Massachusetts are still "gas minded." This pictures shows the twelve foot Forster Bros. powered original gas model designed and built by Morris Sulkin of 48 Compton Street, Boston, Mass.

The air of mystery which pervades this picture no doubt will intrigue the reader. We wonder just what is being done to the little ship, or is a secret conference being held behind the shadow of its wings. Use your own imagination to interpret this.

Picture No. 2 shows Melvin Yates' fourteen foot job taking off at the contest sponsored and conducted by the Gas Model Aeronaut Club of the Chicago Park District. Yates lives at Joliet, Illinois. This contest was held on August 8th, at the Harlen Airport in Chicago. We see that Yates has grown from his old KG job to a more sleek looking craft. He placed third in the Consistency event. Other winners were:

Michael Roll, Dearborn, Mich., 36:16.9. United Airline Trophy and Aero Champ Motor.

Richard Kliefuth, St. Louis, Mo., 31:15. Comet Trophy and Forster Gas Engine.

Carson Carol, Indianapolis, Ind., 18:15.2. Solomon Trophy and Syncro Ale Motor.

John Houboldt, McHenry, Ill., 17:20.3. Clipaire Gas Kit.

Henry Gebhard, Milwaukee, Wis., 15:25. Quaker Kit Wheels, Yr. Sub. to Popular Aviation.

Frank Nekimken, Chicago, Ill., 15:24.8. Taylor Cub Gas kit, Yr. Sub. to Popular Aviation.

Irving C. Goebel, Chicago, Ill., 14:55. 2 Yr. Sub. to Popular Mech., Yr. Sub. to Air Trails.

Henry Schmaltz, Chicago, Ill., 14:5.5. Curtis Robin Kit.

E. Sherhod, Chicago, Ill., 12:18.6. 3½" M& M Wheels, Yr. Sub. to Air Trails.

Buddy Johnson, Joliet, Ill., 11:11.5. $5.00 Merchandise Aircraft Co.

Picture No. 3 shows the activity taking place at this same contest, the official title of which was Midwestern States Gas Model Contest. Mr. B. C. Friedman was contest director. Looking at this picture one can hardly help reflecting that the gas model ban seems to have

*(Continued on page 58)*

Pict. No. 8. A little activity at a gas contest in Australia

Pict. No. 9. Not a bird, just a Bird gas job


Pict. No. 12. The New Plymouth Model Club after its first meet

Pict. No. 7. O. L. St. Clair's plane controlled from the ground

Pict. No. 6. Howard Ide's first gas job, "Miss Chief"

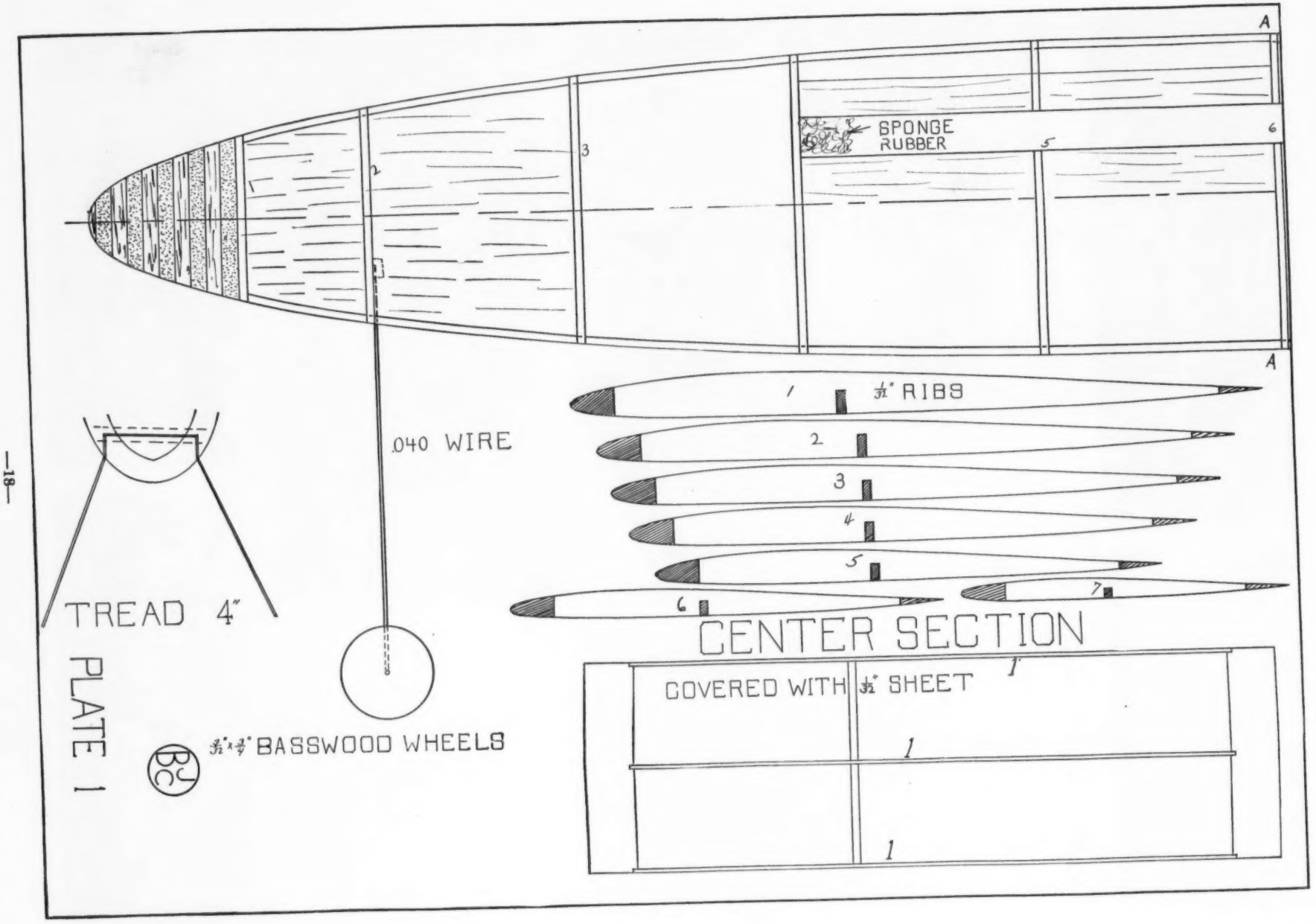
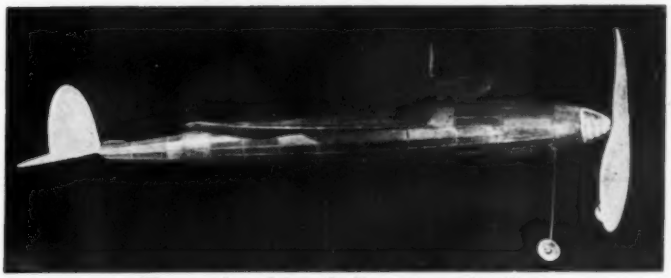

A
SPONGE RUBBER
6
5
3
2
A
1
1/32" RIBS
2
3
4
5
6
7
.040 WIRE
TREAD 4"
CENTER SECTION
COVERED WITH 1/32" SHEET
1"
1
1
3/32" x 3/4" BASSWOOD WHEELS
BJC

PLATE 1

# Build This World Record Speed Job

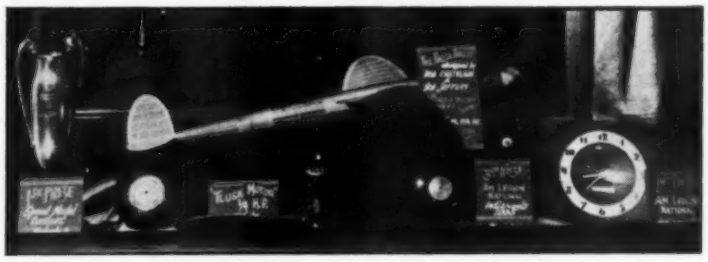


The speed model ready for a 70 m.p.h. trip

## Here Is Complete Construction Data That Will Enable You to Build the Fastest Model in the World

By ROBERT JEFFERY and ROBERT CHATELAIN

IN ORDER to create this high speed plane first we should know just what we are building; how the original performed and something of its development to its present state of efficiency. It has been developed almost directly from ships used by Dick Korda and L. Becker in Cleveland in 1935. Although the present design does not even faintly resemble these ships, nevertheless it can be traced directly to them. The whole story is that we crossed Korda's design with those which we had previously developed, thus the result. Ours had been heavy, low-powered streamline "crates," while the Cleveland fellows depended almost wholly upon light weight and lots of power. We merely used the best points of both types; streamlining, lightness and power to gain the end which we have achieved.



The famous speed model and some of the prizes it has won

The record of the design has been brilliant from the start, having begun its career with a record-smashing victory at Toledo where it easily beat the best of our, and their, square jobs. This happened in January of 1936, and since then the fuselage has been cleaned up considerably, weight decreased, and strength increased. The second ship of this type was equally successful over longer courses, namely 176 foot and 200 foot. It was this design which placed first and third in the National American Legion Contest—speed event—at Indianapolis in 1936. The speed was 50 m.p.h., a new course record, although speeds of nearly 70 m.p.h. have been obtained, both prior to and after this contest.

The plane presented here is neither of the two record-breakers mentioned above, but a third design, slightly improved, and boasting a fuselage design superior to either of the others. It is also designed so that no changes, except for power, need be made.

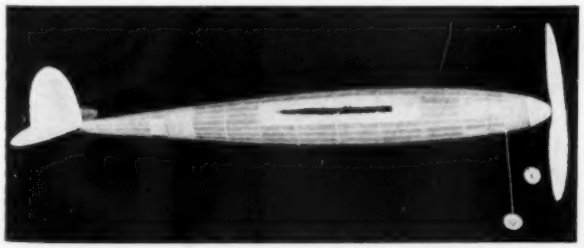
In the only contest in which this particular design has been entered so far, it won at a speed of 60 m.p.h. It was also flown by a 15-year-old girl over the 88 foot course at a speed of 54 m.p.h. On this flight the turns were limited and the powered flight was only about 80 feet, the balance being the glide. The control was very nearly perfect, flying perfectly straight and gaining only a few inches altitude over the above mentioned course. On the fastest flight only enough turns were given it to carry it just past the finish line because of the wall at the end of the room in which the contest was flown.

When building a speed ship, several points must be kept in mind. The most important is that luck plays a relatively small part in a speed contest, that speed depends upon design and construction, coupled with expert flying. You have here the first, the other two depend upon the builder. However, we have, at the end of this article, listed a few hints concerning testing your speed plane. These hints are compiled from nearly two years of building and flying speed planes, the last year in competition.

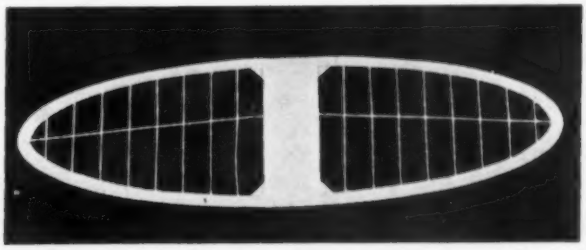
The construction of the ship starts with the wing, not because it is easiest, but because it is different in cross-section (airfoil) from the usual wing. The materials consist of ¼" flat balsa, 10 pound stock, for leading edge; 1/16" flat balsa, 12 pound, for trailing edge; 1/32" flat, 10 pound, for ribs; and 1/16" x 3/16" tapered, 12 pound for spar. It is well to note that all sheet balsa used is "C" grain, or, more simply, quarter grain balsa, for stiffness. The ribs and leading and trailing edges must be cut out with utmost accuracy. Of special note is the method of notching the leading and trailing edges to take the ribs. In order to obtain the correct airfoil the leading and trailing edges must be blocked up from the drawing so that they line up with the bottom of the ribs. Since the wing plan is a true ellipse, both halves can be made over the same drawing by merely reversing the parts—ribs, spar, and leading and trailing edges. The next thing is to sand the leading and trailing edges to shape, making sure they fill out the airfoil. The center section comes next, it being two inches wide, which leaves enough outside to support the rubber bands which are used to hold it down. One inch dihedral is built into each half of the wing and the center section is covered on both sides with 1/32" sheet, grain running spanwise.

The fuselage is as simple as can be hoped for when this type of construction is used. The materials required are 10 pound 1/16" sheet for bulkheads, 12 pound 1/16" square for stringers and a small scrap of hard ⅛"

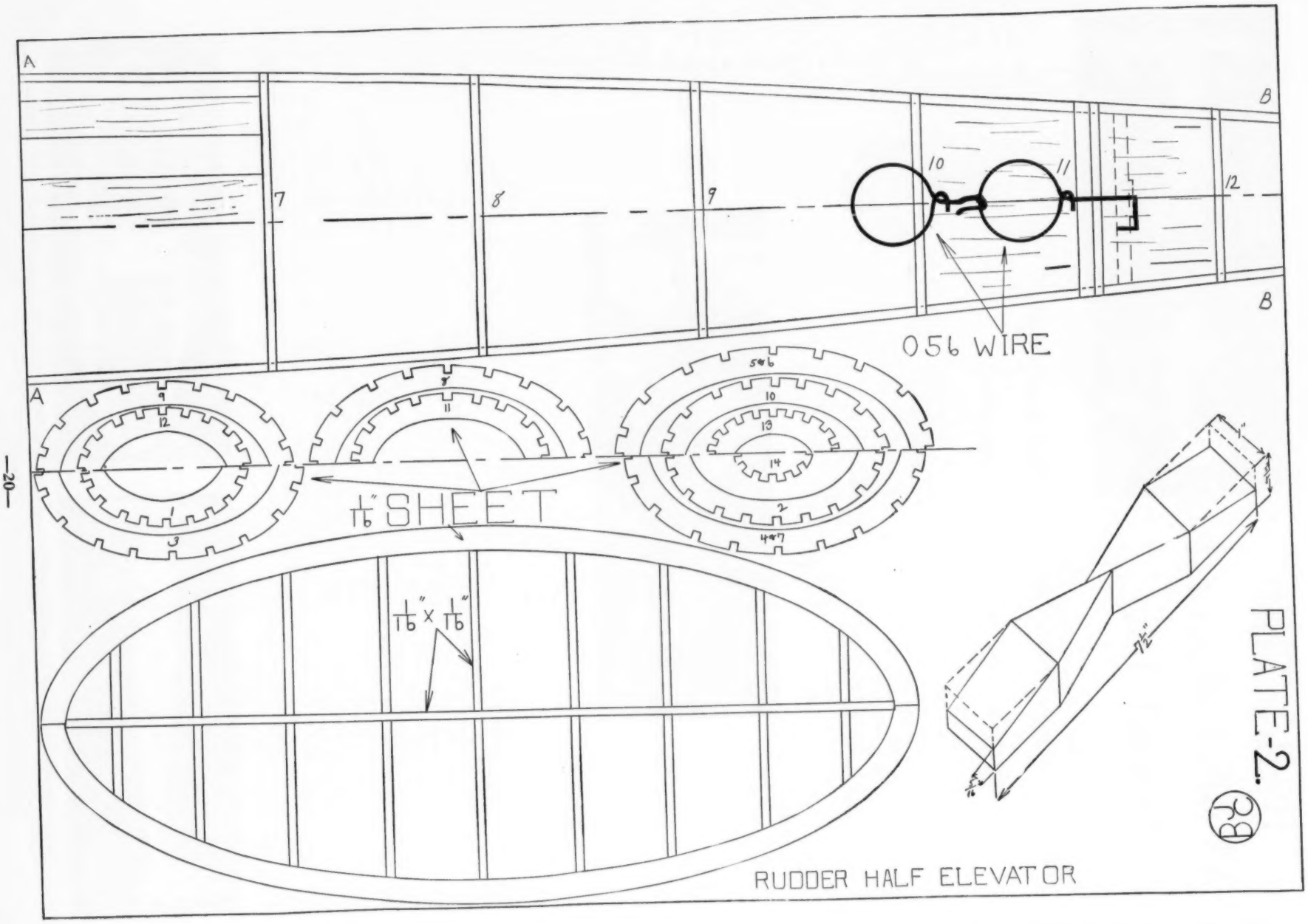
*(Continued on page 40)*

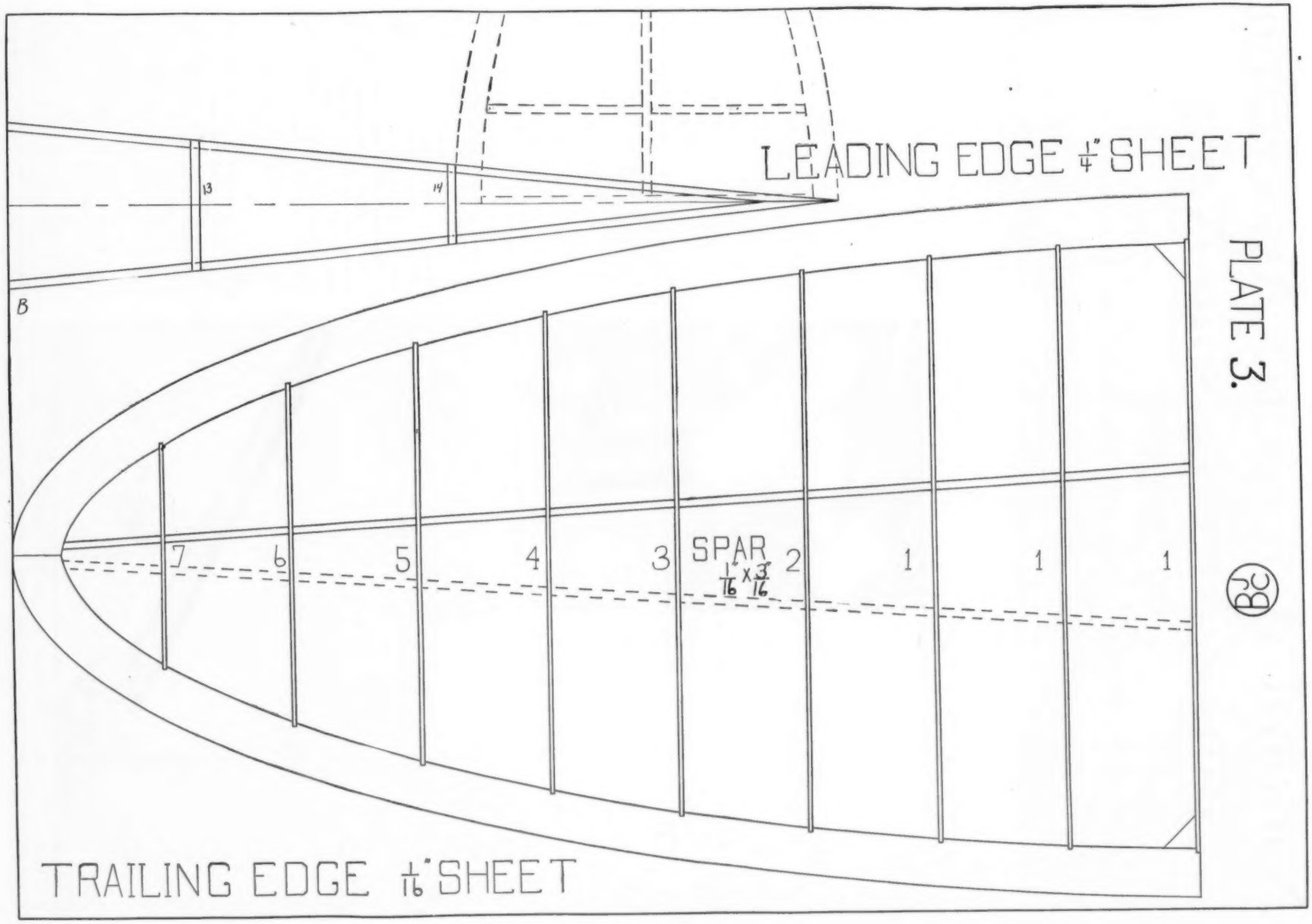


The fuselage showing the slot for mounting wing



The complete wing frame before covering is applied


A
B
7
8
9
10
11
12
056 WIRE
A
B
1/16" SHEET
1/16" x 1/16"
PLATE-2.
RUDDER HALF ELEVATOR


LEADING EDGE 1/4" SHEET
PLATE 3.
(B)
13
14
B
7
6
5
4
3
SPAR 1" x 3/16
2
1
1
1
TRAILING EDGE 1/16" SHEET

# National Aeronautic Association Junior Membership News

***Prepared by National Aeronautic Association, Dupont Circle, Washington, D. C.***

IN view of all the agitation for the banning or severe restriction of gas model activities, a proposed addition to the air traffic rules of the Bureau of Air Commerce is worthy of careful study. (Note that this proposed regulation is not yet official.)

*"Model Flying Activities, supervision of:* No model aircraft shall be flown from an airport or landing field unless permission therefor, in writing, has been secured from the airport manager or his duly authorized representative. The airport manager shall designate that portion of the field to be used and shall take all necessary precautions to assure the safety of the public on the ground and of aircraft in the air. Rules governing the conduct of such activity shall be drawn and shall include:

(1) The definite boundaries of the area to be utilized.

(2) The periods of suspension of activity before, during and after any scheduled or other aircraft operations.

(3) The limitation of duration of flight of the models.

(4) Procedure for the retrieving of models.

"The airport manager shall ascertain that all model operators so engaged are familiar with the rules as drawn."

All regulations are restrictive, of course, and generally tell us what can *not* be done. The privileges of the average citizen must be inferred from a careful study of the regulations.

The restrictive features of the proposed regulation reveal some interesting facts.

The personnel of the Bureau are not distinguishing between gas and rubber powered models. (The regulation simply says, "No model aircraft * * unless", etc. This was not a slip. In the opinion of Bureau personnel, from the standpoint of the safety of the public on the ground and of aircraft in the air there is no justification for any distinction. This attitude is most commendable.

The rules to be included in airport rules for the conduct of model activities reflect

**Barney Johnson of the Gas Model Aeronauts Club of Chicago. He is Illinois state champion.**

the Bureau's principal interest in the safety of model enthusiasts. Rules 1 and 4 are wholly for the safety of the model flyer. Rule 2 is included primarily to provide proper coordination with full-scale activities, but also for the safety of model enthusiasts. Rule 3, of course, makes provision for the safety of the public on the ground, by insuring some control over the area in which the models will be operated.

After this brief review of the proposed regulation and its restrictive features, it might be well to note the inferred privileges:

(1) The regulation indicates that there are areas at most airports where model activities can be conducted without tying up the whole airport.

(2) It indicates that at airports where traffic is not heavy, the main landing area might be used when model and full-scale activities are properly coordinated.

(3) It indicates a healthy interest on the part of the Bureau of Air Commerce in the promotion of model activities, just so long as they can be conducted with reasonable regard for the safety of the public on the ground and of aircraft in the air.

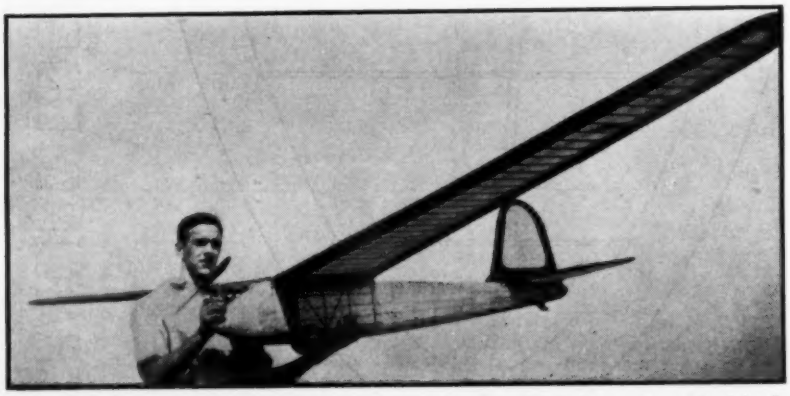
* * *

It is most unfortunate that several state bodies have taken drastic action banning gas models without giving the activity serious study. For years aviation officials have been looking for some antidote for the home-made full-scale airplane. It has been difficult to give every serious minded builder the bad news that, regardless of what new ideas he might be attempting to develop, he would have to get a license to fly his contraption. But the gas-powered model has solved that problem. Flights limited as to time, in gas models—which of all model aircraft most nearly approach the full scale airplane in such important factors as weight distribution—leave the experimental field wide open for the thousands of aeronautical enthusiasts, amateur and professional, who desire and certainly should have the opportunity to work out their own original ideas on any part of an airplane structure just so long as the development can be carried on with due regard for "the safety of the public on the ground and aircraft in the air." Properly regulated gas-powered model activity is the answer.

* * *

The national championship contest at Detroit proved to be a great stimulus to model activities all over the country. Interest continues to grow steadily.

The new Chapter in Topeka, Kansas had no sooner received their credentials as a Chapter in July, than they went right ahead with their first meet. Successful? We should say so. They had nearly fifty contestants and a floating crowd of nearly five thousand. Reports on this meet say that it was extremely well handled. A great deal of the credit belongs to Doctor Hugh D. Wilson, who is the Contest Director of



**Carrol Krupp and his 14 ft., 6⅞ lb. Brown powered gas model. It has a three wheel landing gear and was voted the most unusual plane at the Junior Aviator Nationals, Akron, O.**

**Model plane meet held at the municipal airport, Topeka, Kansas, July 25th '37**

this Topeka Chapter and who was substantially responsible for the running of this meet. Keep your eye on this Chapter. They have made plans way ahead of time, and, believe us, they are headed for success.

Another meet of interest was held in Boston on August 7 under the direction of Gunnar Munnick. This contest brought grand results with two national records. One was an outdoor flight for the Class B Glider, hand-launched, which was made by Sidney Wallerstein with a time of twelve minutes and fifty-seven seconds. The other was made by Martin Phillips under the same classifications with a time of one minute forty-two and eight-tenths seconds. This meet was sponsored by the Junior Aviation League of Boston.

The Midwestern States Gas Meet was held in Chicago on August 8. There was a total of 129 contestants and upwards of 5,000 spectators. Seven states were represented, Illinois, Indiana, Ohio, Missouri, Iowa, Michigan and Wisconsin. Through the substantial assistance of the Chicago Park District this meet was carried off very well. A vote of thanks goes to the Rockford, Illinois Junior Chapter, which in a fine spirit of cooperation agreed to change the date of their meet, which was scheduled for the same day, so that the Chicago Chapters could go ahead with their plans.

Our first lady Contest Director, who is a swell person by the way, organized and ran off a splendid meet at Charlotte, North Carolina on June 27. The story of the boy who won the first place and grand prize in this meet is, to our minds, a very interesting one. This boy, one Howard Bartholomew of Raleigh, with seventeen years to his credit, designed and made his model. He bummed his way to Charlotte, made the longest flight, sold his model to pay his way home and walked off with the Grand Prize—a round-trip ticket to New York for himself and guardian on the Eastern Airlines—safely tucked away in his pocket. Mrs. Clayton Patterson, the Contest Director, is an avid aviator herself and is taking North Carolina by storm in the direction of model activity. A unique turn to this meet was an idea the boys had for defraying the expenses of the meet. They had vari-colored balloons, gas filled, which they sold at ten cents each. Numbered cards were attached; the one returned from the farthest distance within a week received a prize of $5.00 and the one that held the corresponding number in Charlotte also received $5.00. Everything taken into consideration, this meet was a grand success and the boys cleared $25.00 on the meet and will use it as Trophy Money in their Club to stimulate Model Building. Nice going, boys!

Another meet, under the direction of C. Donald McKelvie, Contest Director, was held at Rentschler Field sponsored by the Y. M. C. A. of Hartford, Conn. Several statewide and New England records were broken. Trophies were offered by the Hartford Times, G. Fox and Company and Harvey, Lewis Company, and then there were the Hiram Percy Maximum Memorial Trophy, United Aircraft's Trophy, awarded to the contestant in each group securing the largest number of points, a Baby Cyclone Engine, Hartford Courant's Trophy, The G. E. Prentice Mfg. Company's Trophy and the Sage-Allen's Trophy. So you can see that these boys had something to work for.

Comes word from Oliver F. Billingsley II at Phoenix that the boys there are organizing a new junior chapter. Leave it to the model builders to show the older folks how to get going! This will be the first active NAA unit—junior or senior—in the whole state of Arizona, and we are mighty proud of that.

* * *

## Kansas Forms a Board of Model Contest Directors

Doctor Wilson of Topeka, Kansas again comes to the fore. It was his suggestion to the active F. X. Downey that, during the Kansas State Championship Model Meet, they call a meeting of the Contest Directors and Senior Advisors in the state of Kansas. This Board will promote and regulate all model meets in the state. Information just received informs us that this meeting has been held and that Doctor Wilson has been made Chairman of this Board. Donald Sump of Wichita was made Secretary. At this meeting it was also voted to hold the 1938 Kansas State Meet at Wichita.

**Winners of the Charlotte, N.C., model meet June 27th. R. to L.: Howard Bartholomew, grand prize; Jim Gupton, 2nd prize; Floyd Rogers, 3rd prize**

**A real freak, but it flew at the Mississippi Valley Contest**

We don't have a complete story of the Kansas State Meet as yet, but from what we hear, everyone had a grand time and Mr. Downey did a swell job. But more of that later.

* * *

## Suggestion for New Device on Gas Jobs

Walter Hetherwick of 222 Johnston Street, Alexandria, Louisiana, has sent us a suggestion for controls which might be workable on gas jobs. His letter reads as follows: "The controls are worked by four electro magnets, this includes ailerons, elevator, and rudder. The magnets are run by two or three flashlight batteries with a high step-up coil, which I know is necessary. All the magnets are connected up to the same coil and batteries."

* * *

## Ban on Gasoline-Powered Models

Connecticut has joined Massachusetts in banning gas models. On August 11 the State Commissioner of Aeronautics issued the following regulation:

"No model aircraft shall be flown in or over the State of Connecticut if powered by any means other than rubber bands."

It is hoped that such drastic attitudes on the part of state or local officials may be modified through the cooperative efforts of all those interested in gas model flying. In the meantime, to avoid similar moves in other states, all contest directors should be extremely careful to maintain close liaison with airport managements and adhere strictly to every possible regulation for the safe flying of gasoline-powered model aircraft.

* * *

## New Jersey Assists Model Activity

The State Director of Aviation for New Jersey, Gill Robb Wilson, has taken a very forward step in appointing recently John Bartholomew as Director of Junior Activities. Bartholomew has already organized junior N A A chapters at Irvington, Atlantic Highlands and New Brunswick, N.J. You boys in New Jersey can contact Bartholomew in care of the State Department of Aviation at Trenton, and we are sure he will be very glad to hear from you and to know of your activities, so that statewide model activities may be coordinated.

* * *

## Schedule of N A A Sanctioned Meets

Starting from the fifteenth of August the meets scheduled were as follows:

**C. C. Magrath Jr., one of the oldest model builders in the country**

August 15, Wichita State Championship Model meet at the Wichita Municipal Airport under the Directorship of F. X. Downey and Lewis A. Shore.

August 15. The Indianapolis Chapter Model Meet at the Municipal Airport under the direction of Thomas H. Stephens, a newly-appointed Contest Director.

August 21. Linden Model Aircraft Club held the Union County Gasoline Model Meet at Hadley Airport, South Plainfield, New Jersey directed by Frank M. Krysiak.

August 22. Model Meet held at Sharonville Municipal Airport, near Cincinnati, Ohio, under the guidance of the newly formed Cincinnati Senior Advisory Council for model activities in that vicinity.

August 28 and 29. The St. Louis Chapter sponsored the Mssissippi Valley Model Airplane Meet at the Arena Building and Parks Airport with H. T. Sommers acting director for N A A.

August 29. The Decatur Illinois Senior Chapter sponsored a meet at the Decatur Airport and Hangar under the direction of Doctor G. E. Folkman, another new Contest Director.

August 29. The Jacksonville Model Club sponsored an outdoor model meet at Paxton Field, directed by W. L. Timpone.

August 30 through September 2. The Scripps-Howard Junior Aviator, as previously announced, held at the Scripps-Howard Junior Air Races, with Ed Clarke acting as N A A Contest Director.

September 3 and 4. The Evangeline, La., (Senior) Chapter of the N A A sponsored a state championship model meet, with Rocco Glorioso as Contest Director.

September 4. The Jordan Marsh-Boston Traveler Junior Aviation League held a model contest at Smith Playground, Boston, under the direction of Gunnar Munnick.

September 5. The Syracuse Model Airplane Club and the Exchange Club sponsored the New York State Fair Model Airplane meet to be held at the Syracuse Airport, Syracuse, New York, under the direction of Harry C. Copeland, Contest Director.

September 5. The St. Paul and Minneapolis senior N A A chapters sponsored

**Hilary Kosiki with his Heli-gyro, placing 2nd for original design in the Junior Aviator Nationals**

Use this coupon for either junior membership application *or* for requesting NAA Junior Chapter information.

**NATIONAL AERONAUTIC ASSOCIATION OF U.S.A.**
**Dupont Circle, Washington, D.C.**

☐ Please send me information on how to form an NAA Junior Chapter and a Chapter charter application form. I enclose a 3c stamp for return postage.
☐ I enclose fifty cents for annual NAA Junior membership dues (use cash, check or money order) and hereby make application for Junior membership in the National Aeronautic Association. (Age limit 21 years).

Name .....
(Please print or type)

Street .....

City ..... State .....

Date of Birth.....
(Month, Day, Year)

Membership application approved*.....

*(If membership application is being made and applicant is under eighteen, have parent sign here.)

jointly a State Model Meet, at Fort Snelling, Minnesota.

September 11. The Quaker City Gas Model Association held a gas model meet at the North East Philadelphia Airport, Philadelphia, Pa., with William Berry the N A A Contest Director.

September 19. The Kansas City Chapter of the N A A conducted the Seventh Annual Greater Kansas City Model Airplane Meet at the Old Richards Airport, with E. L. Hughes as Contest Director.

October 12 through 16. The Spartanburg County Fair Association will hold an outdoor meet at the Memorial Airport, Spartanburg, South Carolina, under the direction of George E. Craig, another newly-appointed Contest Director.

* * *

## Mississippi Valley Contest

Two new world records were set by Roy Wriston, 23, of Tulsa, Okla., during the 1937 Mississippi Valley Model Airplane Contest held at the Arena and at Parks Air College in St. Louis, Missouri, Saturday, August 28th and Sunday, August 29th. Wriston set a new world record in Class "A" R. O. G. Stick Type, when his plane stayed in the air for 10:15 during the Indoor Meet. The former record was held by Joe Matulis of Chicago (9:59) who took part in the Mississippi Valley Meet also. Wriston's other record was in the Open Indoor Fuselage event, in which his plane set a new mark at 14:44.9.

Two hundred and twenty-three boys from 14 states entered the 6th Annual Mississippi Valley Model Airplane Meet which was held under very favorable weather conditions. Bob Sommers, who acted as Contest Director for the first time, did a very successful job. Ralph Kummer and Dick Courtial, older members of the Stix, Baer & Fuller Model Airplane Club, acted as his assistants, while Hanns Kolmar handled the publicity of the Meet.

Two thousand five hundred watched the outdoor events held at Parks Air College all day Sunday. Of course the gasoline event proved to be most exciting to spectators as well as to contestants. Roy Marquardt, of Burlington, Iowa won this event with a time of 23:00. His plane crossed the Mississippi river and in spite of an intense search could not be located; Roy, however, received the huge Chamber of Commerce trophy for his flight. Chester "Chet" Peterson, a student at Parks Air College, was runner up in this event with 21:19, while Ray Podolsky of St. Louis, winner of the gas event for the past three years, had to be content with third prize this time. His plane stayed in the air for 16:17.8—a remarkable improvement above the record he set last year when his time was 10:16. The next places were filled by Chas. Bleitner of St. Louis, Bud Faulkner of Chicago, Eldredge Kelsey of Brighton, Ill., and DeWitt Ross, Jr., of Tulsa.

**Richard Korda with his prize winning speed model that flew 70.83 m.p.h.**

Two all expense air trips on a Chicago and Southern Airliner to New Orleans and return were given to those boys gaining the highest points in Senior and Junior events. Richard O'Barski, 18, of Chicago and Arthur Beckington, 14, of Rockford, Ill., were the lucky winners. The silver trophy for the outstanding performance of the Meet for the past five years has stayed in St. Louis. This time, however, this Stix, Baer & Fuller trophy has to travel all the way to Tulsa, Okla., because there was no doubt that Roy Wriston was the hero of the Meet. Besides setting his Indoor records, Roy won the Outdoor Stock Type (Open Class) with a time of 8:54.6. He also was second in the Open Outdoor Fuselage event with a score of 3:22.3. First in this competition was Jos. Matulis of Chicago with 4:2, and second and third in the Open Stick Type, behind Wriston, were Curtis Janke of Sheboygan, Wis., with 6:59, and David Seltzer of St. Louis with 2:20.4. Fourth was Jos. Matulis of Chicago and fifth John Foerster of St. Louis.

**Jerry Kolb and model that set a new N.A. A. stick model record of 41 m., 15 sec.**

**Don Orman who placed 1st in the senior division gas event with 16 m. 31 sec.**

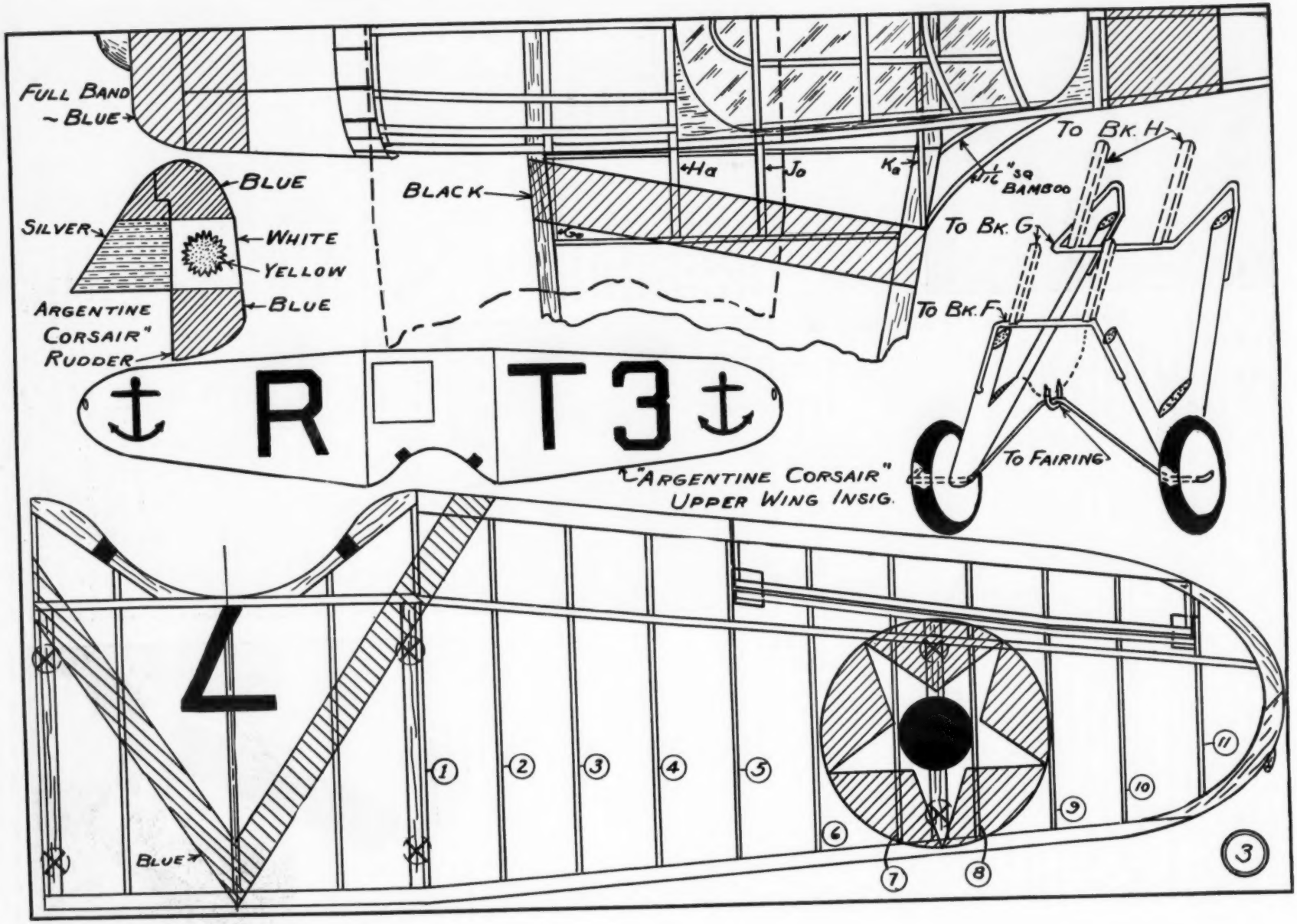
Some of the other scores are as follows: Junior Stick Type Outdoor: 1st, Arthur Beckington, Rockford, Ill., 1:59; 2nd, Bill Riordan, St. Louis, 1:54; 3rd, Wilmer Feltmier, St. Louis, 1:17. Junior Fuselage Outdoor: 1st, Albert Magenot, St. Louis, 1:23; 2nd, Rob't Gibbs, Chicago, 1:22; 3rd, Billy Riordan, St. Louis, 1:2. Stick Type Senior Outdoor: 1st, Wallace Simmers, Chicago, 17:3; 2nd, Walter Huguelet, Chicago, 12:2.2; 3rd, Vernon Sears, Tulsa, 11:00. Amateur Sweepstakes: 1st, Fred Zaiser, 2:30.5; 2nd, Herman Seltzer, 1:25; 3rd, Albert Maginot, 1:16.1.

Winners in the Indoor Contest included Carl Goldberg of Chicago in the Open Stick Type with 19:7; 2nd, was Joe Matulis of Chicago with 17:43 and 3rd, Curtis Janke of Sheboygan, Wis., 13:42; Roy Wriston of Tulsa, Okla., and Marvin Schmidt of St. Louis were placed 4th and 5th. Milton Huguelet of Chicago won the Senior Stick Type with 20:17; Bob Christy, Chicago, Chas. Stuart, Chicago, Chas. Belsky, Chicago and Walter Erbach, Sheboygan, Wis., followed behind him in this order. The Junior Stick Type was won by Wilmer Feltmier, St. Louis with 12:13, with Arthur Backington, of Chicago and Frances Kuntz of St. Louis as runners-up. Richard O'Barski of Chicago grabbed the Indoor Fuselage competition with 13:57 from Walter Erbach of Sheboygan, Wis. (11:34) and Dennis Turner, Chicago (10:43).

The Mississippi Valley Meet is fast becoming one of the most important Model Airplane events of the year. It was co-sponsored by Stix, Baer & Fuller Department Store in St. Louis, Mo., the Missouri State Junior Chamber of Commerce, the Young Men's Division of the St. Louis Chamber of Commerce and Parks Air College. Among the donors of prizes were Stix, Baer & Fuller, the Junior Chamber of Commerce, Chicago and Southern Air Lines, the St. Louis Star-Times, the St. Louis Globe-Democrat, San-Del Printing Co., and Maschmeyer-Richards Silver Co. Newspapers and radio stations co-operated beautifully with the sponsors of the meet. The three St. Louis papers devoted 2,041 lines to the event, while radio broadcasts were held for four days over various St. Louis and East St. Louis stations.

Sunday night all contestants were invited to a banquet in the mess hall of Parks Air College at which Chas. C. Barnett of the St. Louis Junior Chamber of Commerce acted as toastmaster. Other speakers in-

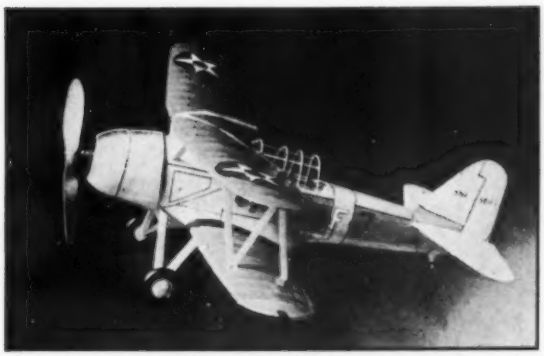
*(Continued on page 56)*


FULL BAND
– BLUE
BLUE
SILVER
WHITE
YELLOW
BLUE
ARGENTINE
CORSAIR"
RUDDER
BLACK
Ha
Jo
Ka
To Bk. H
Wit "39
BAMBOO
To Bk. G
To Bk. F
To FAIRING
R
T3
"ARGENTINE CORSAIR"
UPPER WING INSIG.
L
BLUE
1
2
3
4
5
6
7
8
9
10
11
3

# Build and Fly The Vought SBU-1

## Complete Plans and Instructions That Will Enable You to Create a Flying Miniature U.S. Navy Fighter

By HERBERT WEISS



The completed model embodies great detail

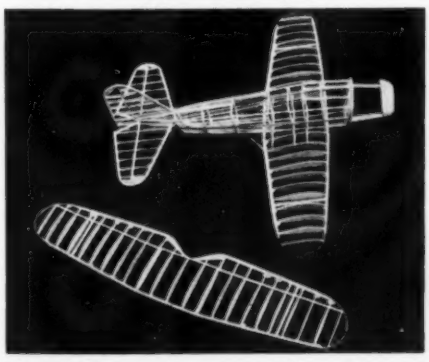
ONE of the first dual-purpose ships in naval service, the Vought SBU-1, is a development of the experimental Vought fighter, the UF3U-1. With a top speed of 205 miles per hour, this sturdy little scout bomber is meeting the exacting demands of service with great success. The power plant is a Pratt & Whitney Twin Wasp Junior of 700 hp. A more recent model, now undergoing tests, is the XSB3U-1, similar to the SBU-1, but with a landing gear which folds backward into the fuselage.

The model is of standard construction throughout. In spite of its scale appearance it flies very well. However, it should be remembered that no model, however well designed, will perform satisfactorily if a poor job of construction is done. A warped wing or elevator might be unimportant on a light duration model, but on a heavy, fast flying scale model, that piece of poor workmanship might mean the difference between a consistent flyer and a plane that "looks good, but just won't fly."

### Construction

Before beginning the model, assemble all of the pictures of the real SBU-1 that you can find. This will enable you to check your work as you go along and to add a great deal of small detail which has not been shown on the plan.

The model in full flight



How the framework appears before the upper wing is attached and the covering put on

### Wings

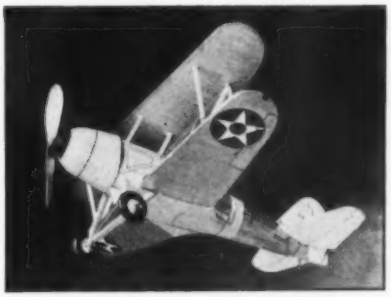
As the lower wing is used as a jig for the assembly of the fuselage, the wings are built first. Ailerons are optional. It is suggested that all movable controls be omitted on a flying model. To make the right panels of the wings trace the left panels which are shown in the plan on thin paper, and then holding the paper up against a window, recopy the panel on the back of the paper. Each wing is assembled as one piece. After the cement has thoroughly dried, cut the spars half-way through at each side of the center section and pin up the tips to the required amount of dihedral. Cement the spars again at the cuts. Put in the 1/8 sq. braces for the struts.

### Fuselage

All of the fuselage formers are made from 1/16" sheet balsa. Formers for the cowl are 1/8" and 1/16" thick as indicated. Make two halves of each former and cement the halves together. It will simplify construction if the stringer positions are simply marked and not cut out until the stringers are ready to be installed. This will prevent misalignment. Bulkheads A, B, C, D and the small bulkheads backing the nose plug are circular and their diameters may be obtained from the plan.

Cement bulkheads G, H, J and K to the center section of the lower wing, as shown in the side elevation. Then cement the main 1/8" x 1/16" stringers in place at the center line of the fuselage, and follow these by the 1/16" sq. stringers above and below the main stringers. Follow these by the remaining fuselage bulkheads and finally the rest of the stringers. The tail post is a strip of 1/16" x 1/8" balsa.

Very realistic when carefully made



How she looks when overhead

After the cowl frame is assembled, it is covered with 1/32" sheet balsa. For an exact model of the real ship, the unshaded portion of the fuselage is filled in with scrap balsa or covered with sheet balsa, and the optional 1/16" x 1/32" stringers added to the shaded section. The fillet is covered with 1/32" sheet balsa from Ga to Ka and carved from scraps between F and Ga.

### Tail Surfaces

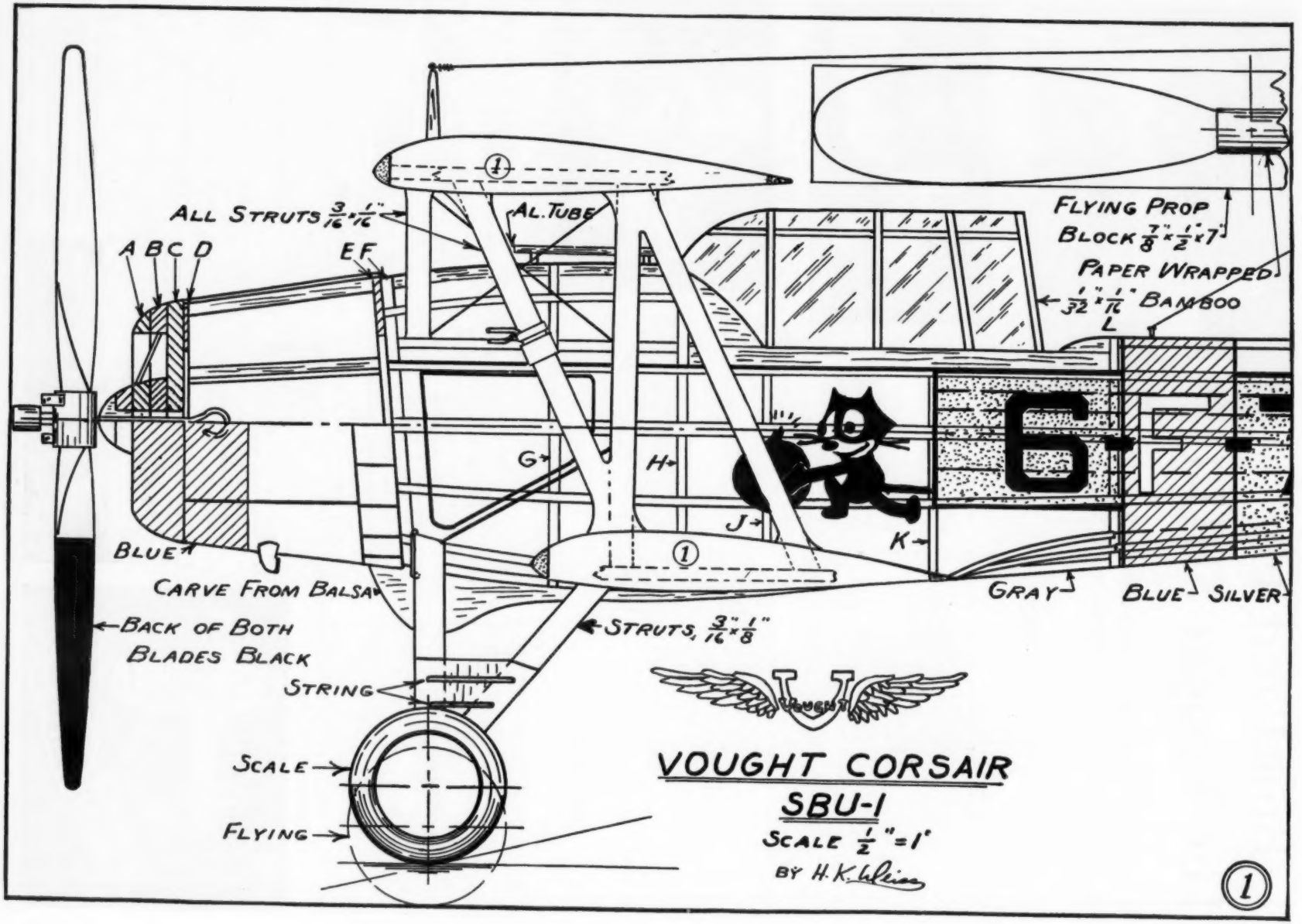
Because of the long tail moment arm, the model flies with scale tail surfaces. The stabilizer is installed before covering so that a tissue fillet is formed.

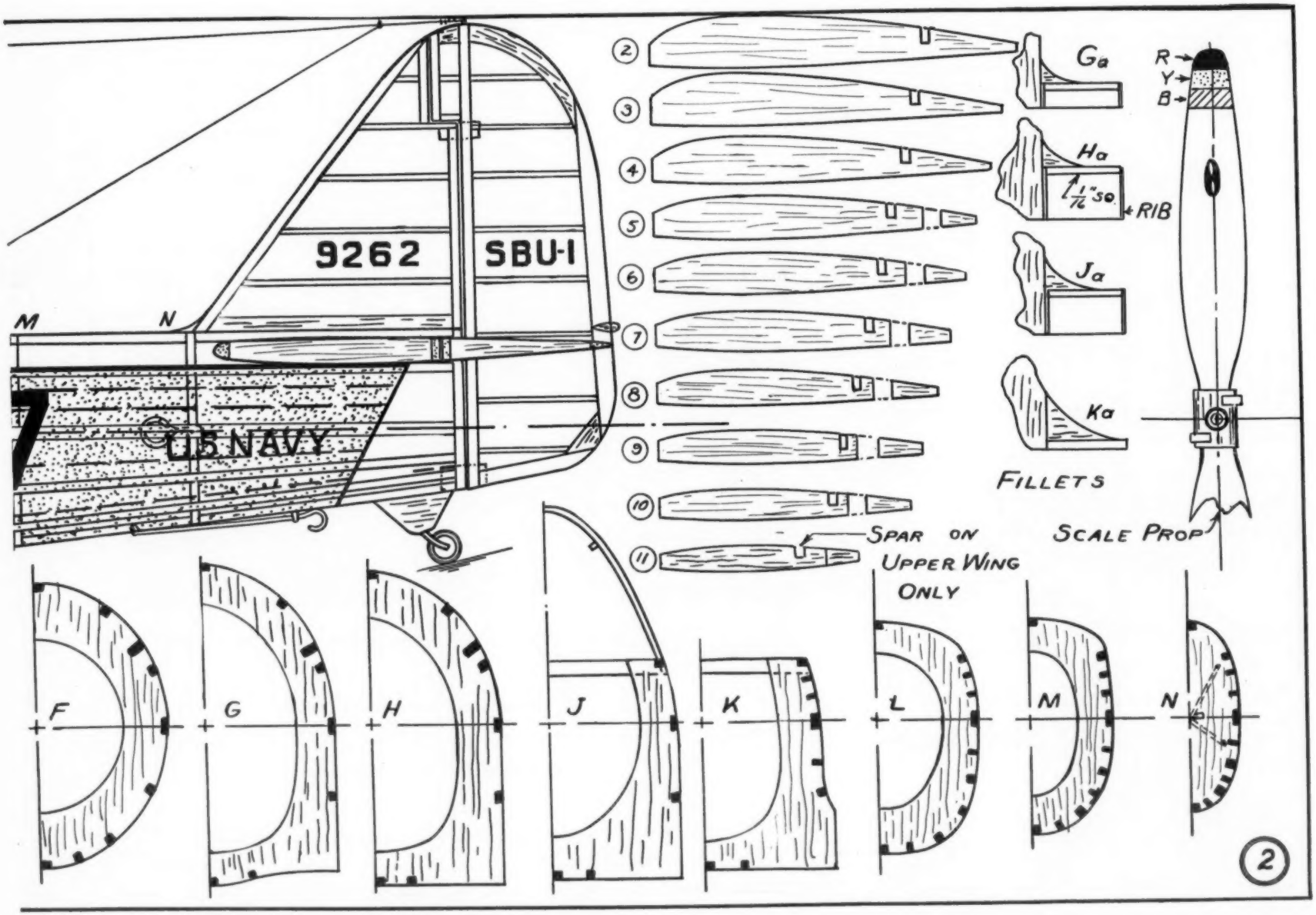
Carefully applied insignia and decorations give it the appearance of a full size craft

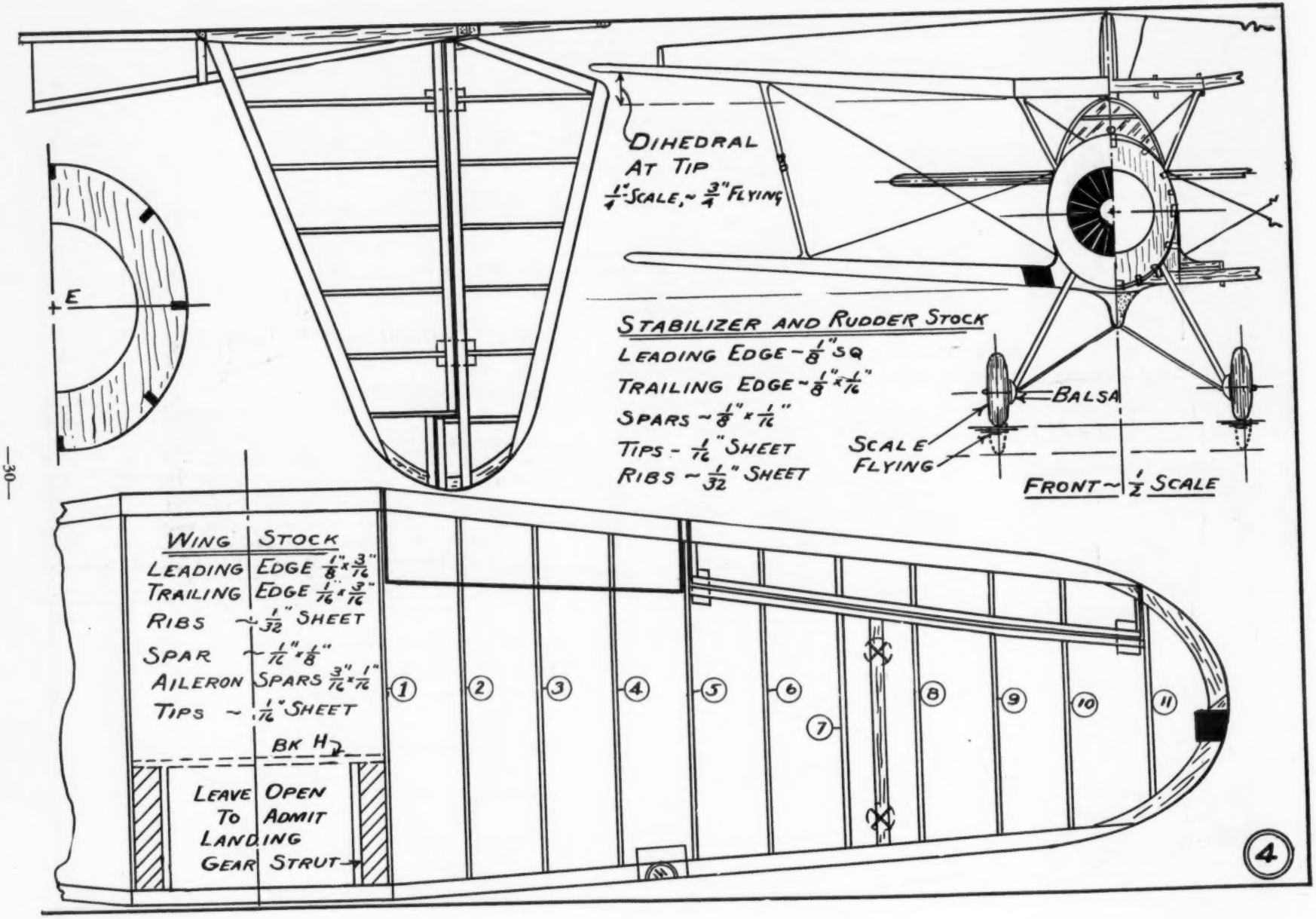
### Landing Gear

Complete details of the landing gear installation are given on Plate 3. This is for a flying model only, of course. A scale model will not require a shock absorbing system. Note that the wire saddle attached to the rear struts is cemented to Bulkhead G only. Use wire of approximately No. 12 gauge for all wire fittings.

*(Continued on page 49)*


ALL STRUTS 3/16 × 1/16
AL. TUBE
A B C D
E F
FLYING PROP BLOCK 7/8" × 1/2" × 7"
PAPER WRAPPED
1/32" × 1/16" BAMBOO
L
G
H
J
K
BLUE
CARVE FROM BALSA
GRAY
BLUE
SILVER
BACK OF BOTH BLADES BLACK
STRUTS, 3/16" × 1/8"
STRING
SCALE
FLYING
VOUGHT CORSAIR
SBU-1
SCALE 1/2" = 1'
BY H. K. Wilson
1


9262
SBU-1
M
N
U.S. NAVY
2
3
4
5
6
7
8
9
10
11
Ga
Ha
1"/12"-30
+ RIB
Ja
Ka
FILLETS
R
Y
B
SCALE PROP
SPAR ON UPPER WING ONLY
F
G
H
J
K
L
M
N
2


E
DIHEDRAL AT TIP
1/4" SCALE, ~ 3/4" FLYING
STABILIZER AND RUDDER STOCK
LEADING EDGE - 1/8" SQ
TRAILING EDGE ~ 1/8" x 1/16"
SPARS ~ 1/8" x 1/16"
TIPS - 1/16" SHEET
RIBS ~ 1/32" SHEET
BALSA
SCALE FLYING
FRONT ~ 1/2 SCALE
WING STOCK
LEADING EDGE 1/8" x 3/16"
TRAILING EDGE 1/16" x 3/16"
RIBS ~ 1/32" SHEET
SPAR ~ 1/16" x 1/8"
AILERON SPARS 3/16" 1/16"
TIPS ~ 1/16" SHEET
BK H
LEAVE OPEN TO ADMIT LANDING GEAR STRUT
1
2
3
4
5
6
7
8
9
10
11
4

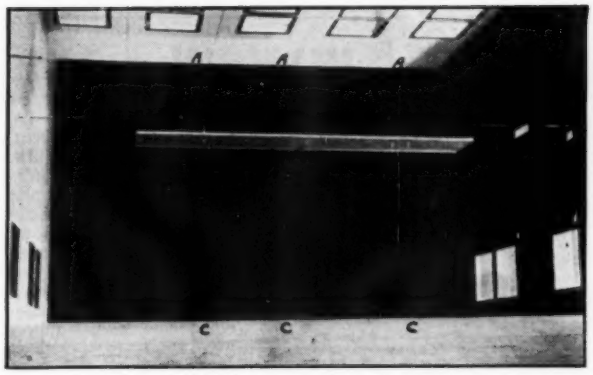


Fig. No. 2. Airfoil test setup in the wind tunnel

Fig. No. 4. Fuselage drag test setup in the tunnel

# Slants On Wind Tunnel Design

## The Development of the Wind Tunnel and How It Is Used to Determine the Aerodynamic Characteristics of Airplanes

By GEORGE H. TWENEY

PERHAPS the most logical point at which to begin this discussion on wind tunnels, is to explain just what a wind tunnel is and how it came to be developed.

The first aeronautical experimenters had various ways of investigating the phenomena of bird flight and other conditions which surrounded man's early attempts at artificial flight. Some built complete gliders; others experimented with models, towing them on railway cars or whirling them at the end of a long arm or string; still others tried dropping models from high towers. All of these methods gave more or less unsatisfactory data and some of them were very expensive in proportion to the information secured. Experimenters then hit upon the idea that the same results would be secured whether the body moved in still air or the body was held in one position and had a current of air blown past it. This decision gave rise to the development of the wind tunnel, which is merely a group of apparatus for moving a stream of air relative to a stationary model, on which the resulting forces and pressures can be measured. Eiffel, in Paris, was one of the first to build such a laboratory and publish the results of systematic tests about 1909. Progress in aeronautical research has been rapid since that time and today the wind tunnel has become the most important tool in the hands of aeronautical research engineers.

There are only two wind tunnels in the world which are large enough to accommodate full-size airplanes; one in France, and the other at the Langley Memorial Aeronautical Laboratory of the National Advisory Committee for Aeronautics at Hampton, Va.

The wind tunnel at the University of Detroit is one of the largest and finest equipped aeronautical laboratories among the colleges of the United States. This tunnel has a closed test section measuring 7' x 10' and is capable of accommodating models up to 8' in span. It has a variable speed range to 104 miles per hour. The air is forced through the tunnel by a 14' 4-bladed propeller driven by a 225 horsepower direct current motor. The tunnel is a horizontal, full-return, continuous-circuit type; the platform is a rectangle 46' x 115'. A balance room is located directly above the throat or working section. All balances are of the semi-automatic beam type, and read the forces acting on the model with an accuracy of .001 lb.

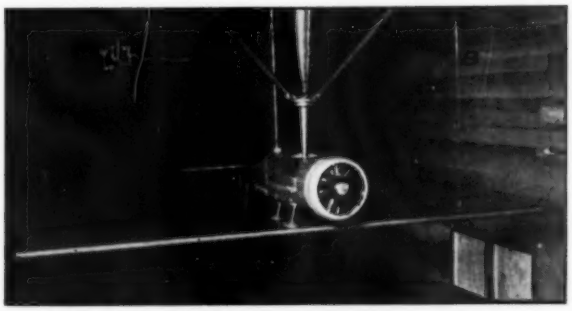


Fig. No. 3. Roll and yaw stability test setup

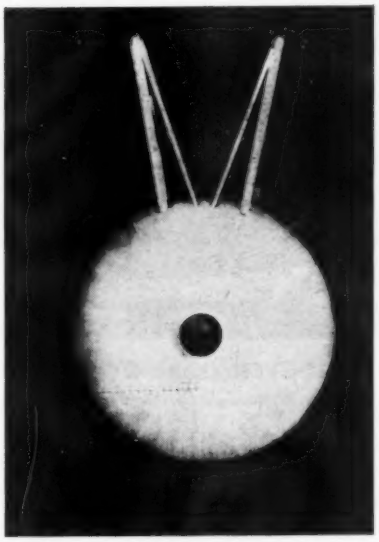


Fig. No. 1. Motor section of the University of Detroit wind tunnel

In Figure 1 is shown a front view of the motor section of the university tunnel. The motor itself is housed in the large streamline fairing which is plainly visible in the picture. The four tips of the propeller blades can be easily discerned; in the background are curved vanes which are used to steer the flow of air smoothly around the corners of the tunnel. A set of these vanes are required in each corner of the tunnel, otherwise the air would pile up and cause considerable turbulence as it went around the turn.

Numerous types of tests can be performed in wind tunnels all of which give data of inestimable value to the aeronautical engineer. By the use of models he can determine all the characteristics of his new design before the trouble and expense of building the plane are undertaken. The qualities and features of new airfoils can be determined; streamline design can be carried out with the greatest of ease, in fact, tests of almost any description may be performed. Nor is the wind tunnel strictly restricted to the aeronautical industry. Numerous automotive corporations have made use of wind tunnels in the design of their new cars; all the streamlined locomotives were tested before they were built, even steamships have undergone the critical eye of the aerodynamical laboratory.

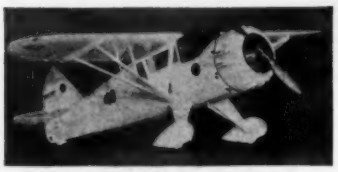
One of the most important applications to the aircraft engineer is in the study and investigation of new airfoil and wing designs, including the effect of flaps and various other arrangements on the per-

*(Continued on page 47)*

# We Apologize to the Thousands Who Were Inconv

## Air Race Enthusiasts

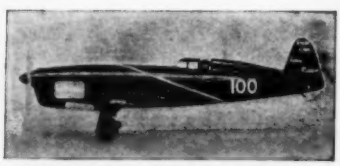
Below are two of the famous Thompson Trophy Winners. Start building up this world famous group. The '37 winner will be available later too. With each "T.T.W." Kit in the ¾" scale, you receive FREE plans for an authentic Air Race Pylon. Be sure to order one of these Kits.



### "MISTER MULLIGAN"

**'35** This plane was reputed to be the fastest cabin plane made at the time it won the Thompson speed classic proving itself by flying over 220 M.P.H., winning the coveted trophy for 1935. No other Mulligan could ever be like it for your Thompson lineup. Complete ¾" Dry Kit, SF-52, only **$2.35**

● ½" Dry Kit D-52, only 65c



### FRENCH CAUDRON RACER

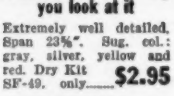
**'36** A speedy flying little beauty of all blue. Has many interesting details, retractable landing gear, a neat "pin stripe" red, white and blue fuselage marking, etc., etc. Complete dry kit (meaning no liquids), span 16⅜", length 17⅜", ¾" Dry Kit SF-63, only ..... **$1.95**

● ½" Dry Kit D-63, only 65c

### CURTISS F11C-2 Goshawk

**A beauty in every way you look at it**

Extremely well detailed. Span 23⅝". Sug. col.: gray, silver, yellow and red. Dry Kit SF-49, only..... **$2.95**



### AERONCA C-3 SPORT

Easy for beginners. span 27". Sug. col.: red and silver. Dry Kit SF-40, only..... **$1.95**

### BOEING 247 HIGHSPEED TRANSPORT

This giant has a span of 55⅝" and a length of 38½", and is nothing less than a wizard for flights, with its two motors powerfully pulling. It is entirely gray colored and weighs 16 oz. The redesigned model has all curved wood printed-out (an enormous quantity) with data for more authentim building and appearance than heretofore, with "filled-in" fuselage, balanced controls, etc. The thoroughly engineered drawing of four large panels (17"x44"), each contains accurate modelling information. Kit SF-35, postfree..... **$5.95**

## Here's What You Get in C-D Kits

**3/4" Kits:** 1. The famous full-size authentic copyrighted C-D drawing with large photographs and plenty of instructions to suit its classification of difficulty of building. 2. Plenty of the proper grade of Japanese tissue for covering. 3. All flat and printed balsa (including necessary fill-in wood). 4. All strip balsa wood. 5. All Kits now contain turned wheels as described. 6. Gray advanced feature, indestructible ready to assemble flying propeller blades and hub. 7. Finest (mechanical) music wire for fittings, not brittle imported wire. 8. Hinge wire for hinges. 9. A pilot head block only, with instructions for carving in every Kit. 10. All necessary well punched thrust washers. 11. Rubber strands for motors. 12. White pine strips or blocks whenever needed. These Kits DO NOT CONTAIN ANY LIQUIDS.

**1/2" Kits:** These are like the ¾" Kits except build smaller models. All authentic in detail. Contain everything needed, except NO LIQUIDS.

**"Reps":** All 20" models. Partly authentic—but with liberties to improve flyability. Contain everything needed, except NO LIQUIDS.

**Gas Models:** Authentic and years ahead of ordinary gas models. Contains everything needed except wheels, shoes, liquids and motor units.

### IT PAYS TO USE C-D's GAS MODEL SUPPLIES TOO

### REARWIN SPEEDSTER GAS-POWERED MODEL

Model recommended to be colored all silver with brilliant red striping and black lettering. Span 64½". Complete plans and details $1.50, deductible from complete kit purchase price (less plans) if purchased within 10 days. Order dry kit GP-69, postfree in the U.S., only..... **$4.85**

## Don't Be Without the Big 64-page Catalog and Large Supplement

Greatest model and homecraft literature ever offered—better, fuller and much more complete than anything ever before attempted. Get your copies at once—featuring flying models, solid models, gas models, parts and supplies; R.R.'s and supplies; ship models, over 5500 tiny items never before assembled in handy compact form. No model builder can afford to be without this literature, equal to 200 pages of ordinary catalog material.

**SEND 15c FOR BOTH COPIES NOW!**

In spite of all the precautions we to... while we moved into our new buildi... was a much bigger job than we a... getting our special machinery pro... our production line in operation, the ... shipping service was momentarily ... disappointed on delivery. Many of ... which we honestly appreciated; to ... regret whatever trouble you were p... —everything is radiant—and with ... floor space, stepped up production, ... up to really give you an even bet... Cleveland has set the pace for year... send direct for the Kits and supplie...

**CLEVE...**
**MODEL & SUP...**
**4508-A26 Lorain Ave. C...**

## Be Sure to Build thi... Stunning New LO...H

One of the Great Silver Fleet. This tw... kit contains absolutely everything nec... liquids, which of course means all the hig... curved parts printed on flat sheets rea... sue, blocks for pilot, etc., etc., and las... drawing and instructions. This twin-m... truding through the wings behind the ... colored all silver. Span 27⅝". Kit D-65, ... postfree .....

**The Complete Li... of t...**

## CLEVELAND "AR-...

**World's Greatest Line ... Fine ... Easy-to-Make Rubber ...wer...**

★ ★ ★ **All Kits Now D... —N...**
Otherwise they're ...olutely

| NO. | NAME | SF. ¾" Scale | D's ½" Scale | ...20" Span | NO. |
|---|---|---|---|---|---|
| 1 | Gr. L. Sport Trainer | $1.95 | $ .65 | | 36 Linc... |
| 2 | Travel Air Mystery | 2.35 | .65 | | 37 Wac... |
| 3 | DeHavilland-4 | 2.85 | .95 | | 38 Buhl... |
| 4 | Curtiss "Jenny" | 2.65 | | | 39 B-J ... |
| 5 | Laird Super-Solution | 1.95 | .65 | | 40 Aero... |
| 6 | Polish Fighter | 2.50 | | | 41 Voug... |
| 7 | Curtiss Helldiver | 2.95 | | | 42 How... |
| 8 | Army Boeing P12-E | 2.25 | .75 | | 43 Doug... |
| 9 | Scouting SE-5 | 1.25 | .55 | | 44 Page... |
| 10 | Sopwith Camel | 1.95 | | | 45 Mart... |
| 11 | A-W Quad Fighter | 1.95 | .65 | | 46 Laire... |
| 12 | Bishop's Nieuport | 1.95 | .65 | | 47 '33 ... |
| 13 | Spad 13 | 1.95 | .65 | | 48 '34 ... |
| 14 | Fokker Triplane | 1.95 | .65 | | 49 Curt... |
| 15 | Fokker D-7 Fighter | 2.50 | .75 | .65 | 50 Curt... |
| 16 | Albatross D-5A | 1.95 | | | D. H... |
| 17 | Bayles' Gee-Bee | 1.95 | .65 | | 52 "Mr.... |
| 18 | Howard "Pete" | 1.25 | .40 | | 53 Grun... |
| 19 | Supermarine S6-B | 1.95 | .80 | | 54 Hugh... |
| 20 | Hawker Fury Fighter | 1.95 | .80 | | 55 Doug... |
| 21 | Hawk P6-E Fighter | 2.50 | .95 | .65 | 56 Cons... |
| 22 | Macon Fighter | 1.95 | | | 57 Old ... |
| 23 | Boeing P-26 Pursuit | 1.95 | .70 | | 58 Ryan... |
| 24 | Lockheed Vega | 2.50 | 1.20 | | 59 Hawk... |
| 25 | Curtiss A-8 | 2.50 | | | 60 Boeir... |
| 26 | Heath Parasol | 1.25 | .35 | | 61 Seve... |
| 27 | Doolittle's Gee-Bee | 1.95 | .65 | | 62 Cest... |
| 28 | Monocoupe Sport | 1.95 | .65 | | 63 '36 ... |
| 29 | Boeing F4B-3 Fighter | 2.25 | .80 | | 64 Beec... |
| 30 | Nieuport 28 Fighter | 1.95 | | | 65 Lock... |
| 31 | Hall Racer | 1.95 | | | 66 Stins... |
| 32 | Boeing 95 Mail | 1.95 | 1.20 | | 67 Fair... |
| 33 | Comper Swift Sport | 1.25 | .45 | | 68 '17 ... |
| 34 | Fokker D-8 Fighter | 1.95 | .55 | | 69 Pontoo... |
| 35 | Boeing 247 Transport | 5.95 | 2.95 | | 70 X5001 |

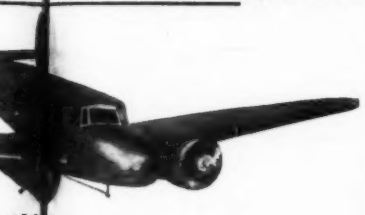
**If Your Dealer Can't S...ply Y...**

● **Cleveland-Designed Models Win More Prizes, More Hono... T...**

# onvenienced by Slow Deliveries During "Moving Day"

we to to avoid any delays in our service
buildi they happened anyway. Moving
we a ipated, but of all the worries of
y pro ly installed, our power lines in,
on, the gest one was in knowing that our
tarily pplied, and customers were being
any of u were mighty patient about it—
ed; to se who couldn't wait—we deeply
were p o. But now, the sun is out again
with r additional thousands of feet of
uction; creased man power, we're geared
n bett service than the type with which
r year If your dealer can't supply you,
supplie ou want PRONTO!

**EL A N D**
**UPLY CO., INC.**
**e. Cleveland, Ohio, U.S.A.**



**thi**
**LOCKHEED ELECTRA**

is tw dered, twin-motored beauty, complete
g nece to build it like all C-D's except the
he hi quality of strip wood, all the necessary
ready t out, all wheels supplied, covering tis-
d last. most important, a full size large C-D
in-mo beauty which has rubber motors pro-
the m es, makes an imposing sight in flight,
D-65, plete except liquids, **$2.75**

**lete Li of the Famous**
**"AR-ISTOCRATS"**
**ine of Fine Balsa and Tissue,**
**bber owered Flying Models**
**w D —NO LIQUIDS ★★★**
**they'r olutely complete**

| REPS 20" Span | NO. | NAME | SF ¾" Scale | D's ¼" Scale | REPS 20" Span |
|---|---|---|---|---|---|
| | 36 | Lincoln Sportplane | .95 | .25 | |
| | 37 | Waco C Cabinplane | 2.65 | .95 | |
| | 38 | Buhl Bull Pup | 1.65 | | |
| | 39 | B-J P-16 Fighter | 2.75 | | |
| | 40 | Aeronca Sport | 1.95 | .65 | |
| | 41 | Vought Corsair V-65 | 2.95 | 1.10 | |
| | 42 | Howard "Ike" | .95 | .35 | |
| | 43 | Douglas O-38 Obs | 2.95 | 1.10 | |
| | 44 | Page's Racer | 1.95 | | |
| | 45 | Martin Bomber | 6.50 | 2.95 | |
| | 46 | Laird Solution Racer | 1.95 | .65 | |
| | 47 | '33 Wedell's W. Wms | 2.35 | .65 | |
| | 48 | '34 Turner's W. Wms | 2.35 | .65 | |
| | 49 | Curtiss F11C-2 | 2.95 | 1.10 | |
| .65 | 50 | Curtiss Export Hawk | 2.95 | 1.10 | |
| | 51 | D. H. Comet Racer | | 1.35 | |
| | 52 | "Mr. Mulligan" | 2.35 | .65 | .65 |
| | 53 | Grumman F2F-1 Fighter | | | .65 |
| | 54 | Hughes Racer | | | .95 |
| | 55 | Douglas Transport | | 3.75 | |
| .65 | 56 | Consolidated A-11 | | | .50 |
| | 57 | Old Gr. L. Trainer 2T1-E | | | .65 |
| | 58 | Ryan ST | | | .65 |
| | 59 | Hawker Low Wing Fight. | | | .65 |
| | 60 | Boeing P-26-A | 2.65 | 1.10 | |
| | 61 | Seversky Fighter | 2.65 | 1.10 | |
| | 62 | Custom Waco C6 | | 1.10 | |
| | 63 | '36 Cantron Racer | 1.95 | .65 | |
| | 64 | Beechcraft C-17-E | | 1.10 | |
| | 65 | Lockheed Electra | | 2.75 | |
| | 66 | Stinson Reliant | | | .65 |
| | 67 | Fairey Battle | | | .65 |
| | 68 | '17 Bristol Fighter | | .95 | |
| | | Pontoon Kit | .35 | | |
| | | X5001 Cleve. Amphibion | | | .65 |

**n't S ly You, Order Direct**

## U. S. ARMY HIGHSPEED MARTIN BOMBER

Claimed fastest service bomber in world. Span 53", length 33¾", weight 17 oz. Colored standard U.S. Army yellow, olive drab, details black. Novel and strong method of duplicating an almost impossible landing gear (but not retractable). Complicated fillets beautifully (and easily) duplicated. Nothing ever before like it—even our Boeing 247. Turned Balsa invisible hub wheels. By simply removing motor spars (the only time-proven efficient methods of multi-motor powering) model is ready for exhibiting. If sold 5 or more years ago, would easily command at least $20.00. Complete printed-out-wood (Giant) Kit SF-45, postfree..... **$6.50**

## SPEND WISELY

More sport, more education, more satisfaction in building one C-D model than a dozen ordinary models. And frequently it's easier—and costs less. Become a C-D fan and

**Be Proud of Every Purchase**

## Letters Like These Come in Every Day

From Dublin, Indiana: **"Been building model airplanes for about four years, and built PLENTY! BUT I can truly say that the six C-D models I've built are the finest, best detailed, and contain the best materials of any I have ever seen."** We're glad to hear it, and we know there are many other beauties in our line that you'll be proud of, too.

Pensacola, Fla., comes in with: **"There are 700 aviation cadets and 200 enlisted student pilots here, most of whom are model fans, so I'm opening a shop. Having built several C-D's, I knew your ads are not just a come-on sucker game, but mean what they say. So I want to carry your line and give the fellows a real Kit for their money."** Good stuff Pensacola, and from the tone of your letter we know you'll make a real success of it. More power to you.

Good news from Hartford, Conn.: **"I am an old C-D fan, and it was through building your Kits that I have the job I enjoy today."** Glad to hear it, Hartford, and here's wishing you all the luck in the world.

A dealer in Texas writes: **"I have received all your orders with 100% quality and service. Am glad I changed over to C-D's."** Hope other dealers read this, and take the hint. We dare you.

Nashville has this to say: **"I wish to let you know that Cleveland Kits seem to be Nashville's favorites. In a contest, every built-up model that won a prize was a C-D."** Thanks, Nashville, and congratulations. It's happening other places, too, that's why we are running that big line of type across the bottom of the page—read it!

***Build C-D's—and You're Building the Best!***

## New C-D P26-A Fighter

Model is dazzling with its yellow wings, blue fuselage and gorgeous red and white scallops and stripes. Radio antenna adds unusual smartness. High speed flyer. Span 21". (Dry Kit SF-60, complete except no liquids, only..... **$2.65**
(Dry Kit D-60., $1.10)

**Don't Fail to Build This Keen**
## CURTISS HAWK P6-E FIGHTER

Hard to tell this actual 20" model pnoto from our ¾" model. Full of typical C-D authentic features and details. Speedy flights. Kit R-21, complete (except liquids), postfree, only..... **65c**

**Pride of the Gas Model World**

## STINSON RELIANT GAS-POWERED MODEL

**We suggest coloring to be all silver with blue trimmings, black lettering. Span 82". Complete plans and details $2.25, deductible from complete kit purchase price (less plans) if purchased within 10 days. Order dry kit GP-66, postfree in U. S., only..... $8.50**

## READ BEFORE ORDERING

New dealers all over the country are switching to the C-D line, so before ordering direct, go to your own dealer and see if he can't supply you. If he can't, order direct from us (but PLEASE mention your dealer's name, so we can offer him the C-D proposition). In ordering direct, remember that all transactions are subject to our regular catalog shipping instructions, most important of which are: Send check, or M.O. (cash at own risk). No C.O.D.'s. Add 15c packing charge to ALL orders for parts. Canada, Mexico, British Isles, add 10% to ANY order sent to us; all other countries, 20%.

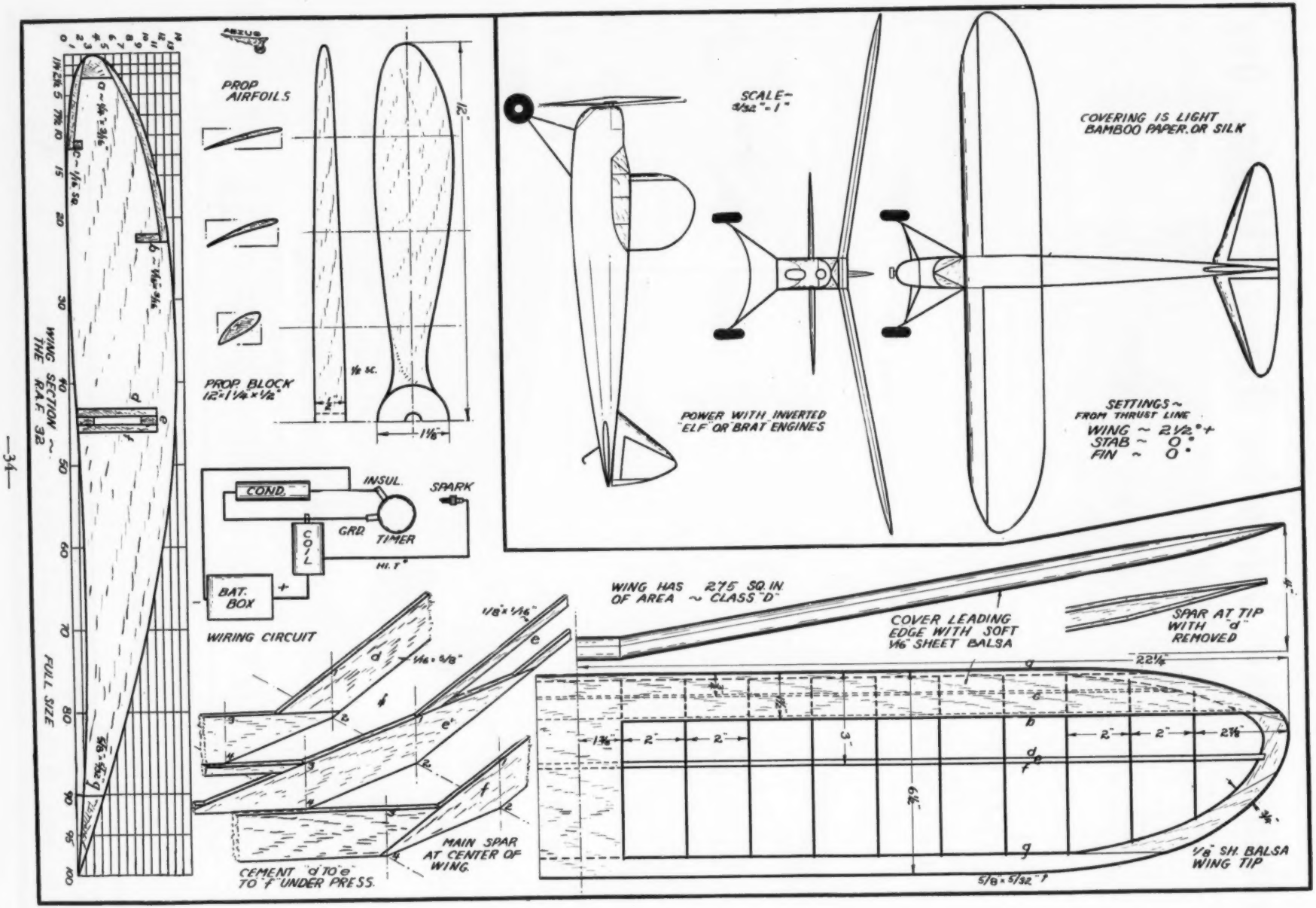
## HOP ABOARD, MR. DEALER, WE'RE GOIN' TO TOWN

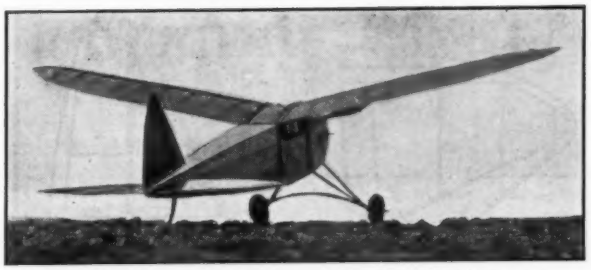
Dealer sales on C-D's are booming. If you're not handling this steady-repeat, business building line, you're missing the BIGGEST PROFIT opportunity in the whole field. Write at once for details. Clubs and Schools get our Club offer.

**EUROPEAN DEALERS** Communicate with our European Factory Representative: H. Vilen, Nybrokajen 7, Stockholm C, Sweden. Attractive territories still available. Regular full factory discounts allowed. European factory Stock Depot will give you quickest deliveries, 24 hour service, at no extra cost. Australian and New Zealand dealers: Write to K.D.C. Mfg. Co., 113B Bathurst St., Sydney, Australia.

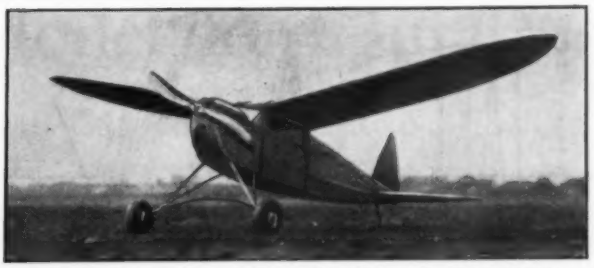
**See Our Ad On the Back Cover**

**nes Than Any Other Line of Model Airplanes in the World ●**


PROP AIRFOILS
PROP BLOCK 12"-1 1/4"x1/2"
12"
1/2 sc.
1 1/8"
SCALE- 3/32" = 1"
COVERING IS LIGHT BAMBOO PAPER OR SILK
POWER WITH INVERTED "ELF OR BRAT ENGINES
SETTINGS ~ FROM THRUST LINE
WING ~ 2 1/2° +
STAB ~ 0°
FIN ~ 0°
WING SECTION ~ THE R.A.F. 32
FULL SIZE
INCHS
COND.
INSUL.
SPARK
GRD.
TIMER
COIL
HI. T°
BAT. BOX
WIRING CIRCUIT
WING HAS 275 SQ. IN OF AREA ~ CLASS "D"
COVER LEADING EDGE WITH SOFT 1/16" SHEET BALSA
SPAR AT TIP WITH "d" REMOVED
22 1/4"
13/16"
2"
3"
6 1/4"
2 7/16"
1/8" SH. BALSA WING TIP
5/8 x 5/32" T
1/8" x 1/16"
1/16" x 3/8"
MAIN SPAR AT CENTER OF WING.
CEMENT "d" TO "e" TO "f" UNDER PRESS.



From the rear it has graceful and stable lines



With its inverted motor and cabin it is neat and realistic

# How to Build a Pee Wee Gas Model

## Here's What You Have Been Looking For—A 45 Inch Model for "Small" Engines That Is Easy to Build, Easy to Carry and Easy to Fly

**By MALCOLM ABZUG and RICHARD WACHTELL**

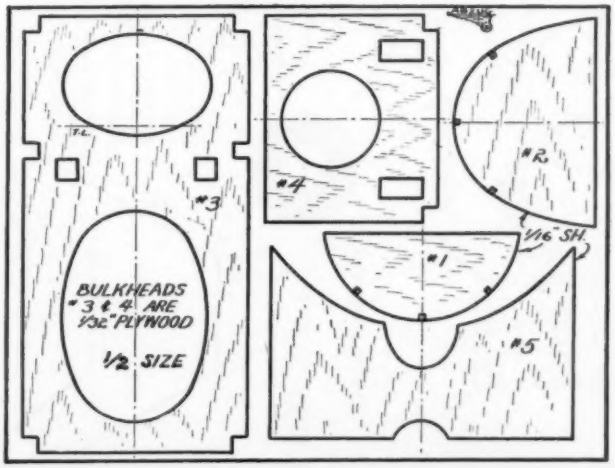
IT SEEMS only a short while ago that my collaborator and myself were members of that large group of model builders who liked the idea of gasoline-powered models but were unable to grow enthusiastic over their clumsiness, their short life and their high cost of construction and up-keep. However, at that time as if in answer to our unspoken supplication, the first small engine appeared on the market, the Elf engine, and in a few months, the first Shrimpo was dodging pop flies at the local ball park. But this first model, and the second for that matter, were far from perfect for reasons that will follow shortly, and the third Shrimpo, the present one, was designed and completed at the end of last fall. After a few test flights winter set in, and veteran modelers will have no trouble recognizing the peculiar feeling suffered by model builders on getting up in the morning and listening to the wind howl outside while looking at a fine outdoor ship in the pink of condition just a-settin' . . . . . just a-settin'. Foolhardiness and ingenuity overcame prudence, and in a week, we found ourseives possessors of the first indoor gas job ever built. The trick was accomplished with a nine foot high jump pole that was heavily weighted at one end, a ten foot length of tough fish cord, and a bronze bushing in these relative positions:

This gives you an idea of its size

The pole stood in the center of the floor of a small gymnasium. The cord led from the pole to the wing tip of the "indoor plane" where it passed through a small bronze bushing at the center of pressure of the wing. A retainer at the top of the pole to prevent the cord from coming off and four strong, hard walls completed the picture. With engine barely popping over and set for a run of 45 seconds, the S-3 rolled along the polished floor and gaining speed, picked up. Once in the air, for some unaccountable reason, the engine revived up, and in a few seconds, the pictures we were going to take would have shown a big blur at the end of a fish cord. By the time that the more timid spectators were retreating towards the doors of the room, the engine cut and when the plane touched the floor it was almost capsized by an immense concerted sigh of relief. One more flight like this and miraculously, all our impatience for the spring vanished and the S-3 was gently and respectfully consigned to the shelf from which it had come. You may be very sure that the next flights took place in the wide open spaces, but it was only after quite a few long, soothing, outdoor flights that I was able to carry the S-3 into a room without breaking out into a clammy sweat and looking furtively for a door. As the indoor flights were notable for speed and danger, the outdoor flights were distinguished by absolute dependability and consistency.

In the first stages of adjustment, the model was unintentionally placed in what are dangerous positions for any model; steep right and left banks. The model was not harmed on landing. Flights are uniformly fine, and climbs of over one hundred feet in the space of 45 seconds followed by long flat glides are usual. In take-offs, the S-3 actually beats the proverbial model; takes off on a dime and has a nickel left. The small size of this gas job has led us to make the wing in one piece and the tail an integral part of the fuselage. This considerably facilitates setting up for flights and yet causes no inconvenience in transportation.

The S-3 meets all N.A.A. specifications for a Class D fuselage model.

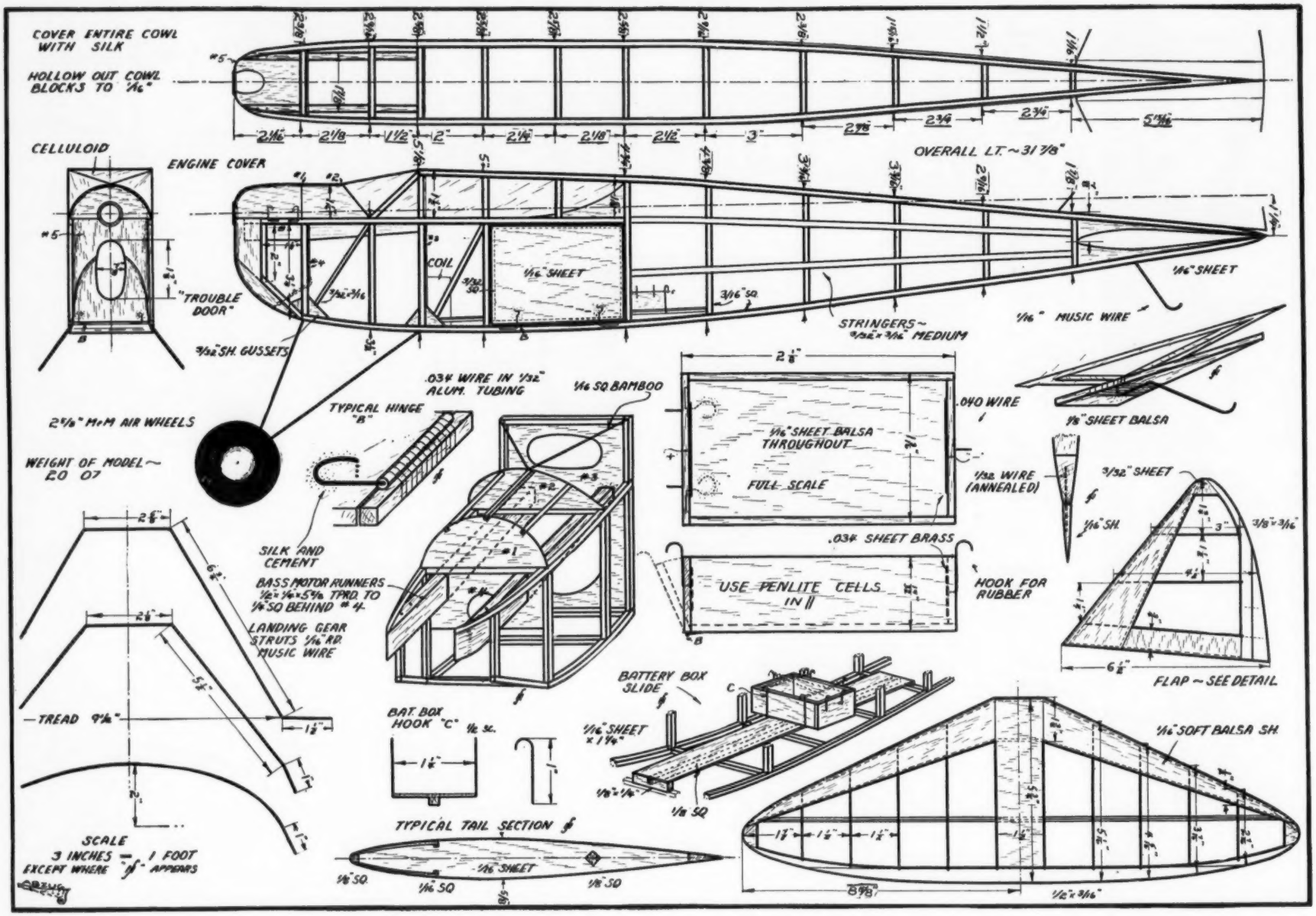



### CONSTRUCTION

#### Fuselage

But hold on for a minute. Before you pick up one piece of balsa, there is one thing that you must understand. The S-3 is a gas job, That

*(Continued on page 54)*


COVER ENTIRE COWL WITH SILK
HOLLOW OUT COWL BLOCKS TO 1/16"
OVERALL LT. ~ 31 3/8"
CELLULOID
ENGINE COVER
"TROUBLE DOOR"
3/32" SH. GUSSETS
COIL
1/16" SHEET
3/16" SQ.
STRINGERS ~ 3/32" x 3/16" MEDIUM
1/16" MUSIC WIRE
2 1/8" M.M AIR WHEELS
WEIGHT OF MODEL ~ 20 OZ
.03" WIRE IN 1/32" ALUM. TUBING
1/16 SQ. BAMBOO
TYPICAL HINGE "B"
SILK AND CEMENT
BASS MOTOR RUNNERS 1/2" x 1/16" x 5 7/8" TPRD. TO 1/16" SQ BEHIND #4
LANDING GEAR STRUTS 1/16" DIA. MUSIC WIRE
TREAD 9 1/16"
SCALE 3 INCHES = 1 FOOT EXCEPT WHERE "ft" APPEARS
2 1/8"
1/16" SHEET BALSA THROUGHOUT
FULL SCALE
.040 WIRE
1/8" SHEET BALSA
1/32" WIRE (ANNEALED)
3/32" SHEET
1/16" SH.
3/8" x 3/16"
.03" SHEET BRASS
USE PENLITE CELLS IN II
HOOK FOR RUBBER
FLAP ~ SEE DETAIL
BATTERY BOX SLIDE
1/16" SHEET x 1 1/4"
1/8" SQ.
BAT. BOX HOOK "C" 1/2 SQ.
TYPICAL TAIL SECTION
1/16" SHEET
1/16 SQ.
1/16" SOFT BALSA SH.
1/2" x 3/16"

# Designing Your Model for Duration

Chapter No. 5
Article No. 67

By
CHARLES HAMPSON GRANT

## How to Design the Stabilizer and Final Suggestions on Proportioning Your Model that Will Contribute to its Successful Operation

IN preceding articles of this series the complete procedure of designing a duration model has been carried through to the point of showing how the stabilizer area may be determined by use of a general rule. The rule specified in the case of the model being designed as an example, that the stabilizer should have approximately 66 square inches of area. This will be correct for models of orthodox design.

In models of unusual design the area required is effected to a high degree. Therefore it is advisable to calculate the correct amount of area by a method that takes into account such variations of design. The formula for stabilizer area given in preceding articles makes allowances for these variations and it may be used in this case. The formula and its solution is as follows:

$$a_s = a_s\left(\frac{D}{S}\right)+0.67\left(\frac{A}{M}\right)\left(2C+N\right)\left[1-\left(\frac{Q+\frac{2X}{M}-2}{5}\right)\right]\left(1-\frac{(G+2T)}{4C}\right)$$

In the formula, as represents the required stabilizer area; D = the propeller diameter, = 18 in.; S = the wing span, = 46 in.; A = the wing area, = 200 sq. in.; M = the stabilizer moment arm, = 23 in.; C = the chord of the wing (average), = 5 in.; N = the nose length of the fuselage, = 14 in.; Q = the angular difference between the wing and the stabilizer. The angle of incidence of the wing is three degrees and the angle of the stabilizer is minus two degrees. However, as the stabilizer is cambered and has a lifting section it is set at three degrees more negative than stabilizers of uniform section. Therefore three degrees must be added to the minus two degrees in order to get the *effective* angular difference. Thus $(-2° + 3°) = +1$ degree. Then the angular difference is $(3° - 1°) = + 2°$.

The three degrees in the quantity is the wing incidence and the $(+ 1°)$ is the *effective* stabilizer incidence, so Q = 2. (X) = the upward distance from the line of thrust to the wing center section, = 3 in.; G = the distance from the center of gravity to the center section of the wing, = 3.5 in.; T = the upward distance from the center of gravity to the line of thrust, = 0.5 in.

Now the formula may be solved by substituting the proper numerical values in it in place of the symbols. When the substitution has been made, the formula appears as follows:

$$a_s = a_s\left(\frac{18}{46}\right)+0.67\left(\frac{200}{69}\right)\left(10+14\right)\left[1-\left(\frac{2+\frac{6}{23}-2}{5}\right)\right]\left(1-\frac{(3.5+1)}{20}\right)$$

$a_s - a_s(0.39) = (1.94)\ 24\ (0.95)\ (0.775)\ (0.61)a_s = 38.5$, or $a_s = 62.6$ *square inches.*

This value of stabilizer area is the minimum that should be used for a stabilizer of uniform section. When a cambered stabilizer is used it should be multiplied by (0.8). Therefore the minimum area to be used should be $(62.6 \times 0.8) = 50$ square inches.

In applying the general rule to determine the correct area, 20% additional area was added to the minimum required in order to insure excellent stability. Therefore, by adding 22% more area to the value given by the formula, we have $(50 \times 1.22) =$ 61 sq. in. Thus the stabilizer should have *61 square inches of area.* This is a little less than the 66 sq. in. specified by the *general rule* because the formula takes into account such stabilizing factors of general design as the position of the C. G., the wing and the line of thrust, which the general rule does not embrace.

Finally the outline of the stabilizer should be determined. To insure greatest efficiency it should take the form of an elipse, as shown in figure No. 127, with the tips quite pointed.

The design of your duration model now is nearly complete. The only step remaining is to design the landing gear. This serves three functions. First, it provides a means of take-off and landing. Second, it serves to bring the center of gravity forward by weighting the nose of the model. Third, it serves to lower the center of lateral area and increase stability.

In designing this seemingly unimportant part of the airplane, you can either put the crowning glory to a fine model or ruin it. It should be designed so that it is as far forward as possible in order to make its weight effective in bringing the C. G. forward or to the predetermined point at which you wish it to be located. Also the wheels should be large enough in diameter to create enough side area and thereby insure a low C. of L. A. Of course it should be long enough to provide proper propeller clearance and streamlined as far as possible to keep the drag down to a minimum.

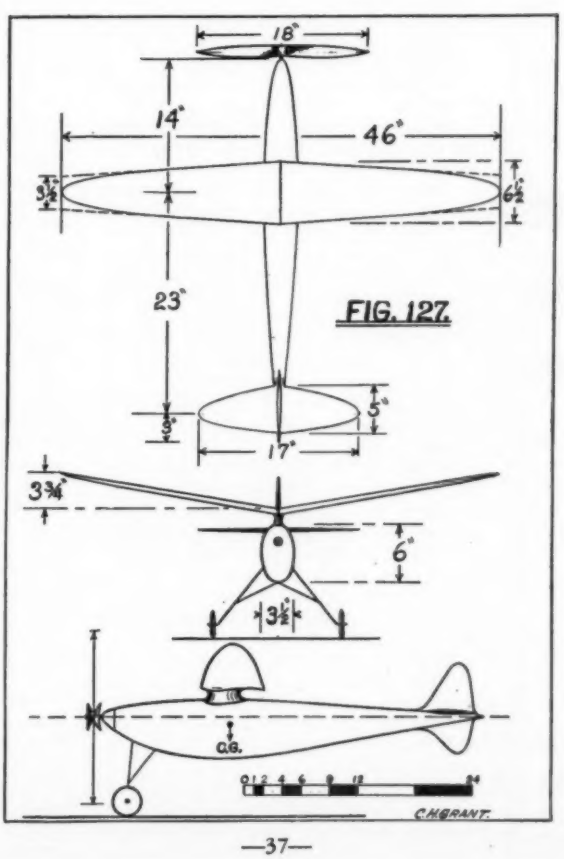


FIG. 127.

When you have carried out all of these principles in the structure of your duration ship, you will be ready to meet the "best of them" and be sure of making a fine showing.

Following is a complete outline of the measurements and rules for designing the duration model discussed in the preceding pages, which will help the model engineer to visualize the proportions of the plane more completely:—

Wing span = 46 inches.

Airfoil section = Grant X-8 or R.A.F. No. 32.

Average wing chord = 5 inches.

Aspect ratio = 9.2 (9.6) including cutaway wing tips.

Wing angle of incidence = 3 degrees.

Amount of dihedral = (3.83) inches rise on each wing tip. This is equal to a rise of *one*

*(Continued on page 38)*

## Designing Your Model for Duration

*(Continued from page 37)*

*inch* per foot of wing span.

Propeller diameter (6 oz. plane) = 16 inches = 34⅔% of the wing span.

Propeller pitch (6 oz. plane) = 24 inches = 1½ times propeller diameter.

Propeller blade area (same for any size propeller the pitch-diameter ratio of which is 1.5) = 30 square inches.

Size of block from which to cut propeller by diagonal method (6 oz. plane) = 16" x 2.96" x 1.38".

Propeller diameter (8 oz. plane) = 18 inches = 38% of wing span.

Propeller pitch (8 oz. plane) = 27 inches = 1.5 times diameter.

Propeller blade area = 30 square inches.

Size of block from which to cut propeller by the diagonal method = 18" x 2.65" x 1.26".

Length of nose (center of wing to front of nose) = 14 inches or 60% of tail moment arm.

Total length of fuselage = (23 + 14 + 3) = 40 in.

Maximum cross section area of fuselage $\frac{L^2}{100}$ = 16 sq. inches.

Maximum depth of fuselage of eliptical cross section = 6 inches.

Maximum width of fuselage = 3¾ inches.

Area of fin = 24.14 sq. in. = 12% of wing area. (Uniform airfoil cross section.)

Area of stabilizer 61 sq. in.

Aspect ratio of the stabilizer 6.

Shape should be eliptic.

Stabilizer airfoil section Clark Y.

Stabilizer angle of incidence —2 degrees.

Distance of wing center section above the thrust line 3 inches, ⅛ moment arm of the stabilizer.

The distance of the C.G. below the thrust line ½ inch 1/46 moment arm of stabilizer.

Distance of bottom rim of wheel below the lowest point of the circle described by the tips of the propeller blades when thrust line is horizontal = 1½ inches: (about 1/12 of propeller diameter).

The preceding list of general specifications for a duration model should be of great assistance in guiding the model designers in the process of assigning the correct proportions to his plane.

The art of designing model planes, however, does not depend entirely upon knowing *what* to do, but rather upon *how* to do it: upon that elusive, indefinable, inherent quality that is a product of natural mechanical vision and experience born of hours of patient experimentation. It may be said that the art of knowing *how* to do a thing is acquired by finding out what not to do through bitter experience.

In the final analysis the quality of your duration model will depend largely upon your own natural ability as a designer, though the proportions as outlined here, will contribute fundamentally to the success of your plane.

It is not absolutely necessary to carry out the design given here in order to be assured of success. This design is simply one of the best arrangements. The principles involved may be applied in several different ways.

For instance, it is not necessary to use a wing with straight dihedral. Other features of design may be used to insure lateral stability. The center portion of the wing may be made without any dihedral, the dihedral angle feature being applied to the wing tips instead. In such a case each wing tip should be dihedraled (upward) from points a distance one-seventh of the total wing span in from the tips. In other words, 15% of the wing at each tip will be slanted upward. When this type of dihedral is used, it is necessary to raise each tip only ⅔ as much as if the straight type of dihedral is used. This means that instead of raising each wing tip 3.83 inches inches as specified in the outline, each tip should be raised about 2.6 inches when this latter form of dihedral is applied to your wing.

A combination of the two forms of dihedral may be used effectively if you happen to fancy the idea. The wing may be dihedraled slightly at the center and added dihedral may be given to the tips. In such cases the total rise on each wing tip should be about 75% or ¾ as much as if a normal dihedral should be used. That is, each tip should be raised about 2.87 inches under these conditions. This form of dihedral will give your model unusual stability and will be conducive to a straighter flight. Usually it causes the plane to fly in a circle of fairly large radius. The amount of torque developed by the propeller has a great deal to do with this however: the greater the torque the smaller the circle of flight. On any model, the torque may be reduced by using a propeller of greater blade area or of smaller pitch or a combination of both.

The efficiency of the plane depends a great deal on the wing section used and upon the degree to which it is streamlined. Streamline efficiency usually depends upon the patience and care used in carrying out this quality. However, the selection of a suitable wing section depends upon knowledge gained from study and experience.

A good gliding section with a high L/D ratio may not always be best for your duration plane. It may be a very fast section and therefore will have a high sinking velocity. After all, the sinking velocity is the point which is important in duration model performance.

If the designer prefers to use a wing section other than those recommended in the outline of design, he should bear in mind several factors when making his choice. High efficiency is not the only requirement. The wing should have a high lift coefficient as well. The ideal situation is that in which the wing gives a high lift and at the same time has a high L/D ratio.

For instance, the Clark Y has a high L/D ratio (about 22) but the lift coefficient is not relatively large. Therefore it is quite fast on the glide. On the other hand, it provides a good rate of climb. However, there are other sections which provide a high rate of climb, a high L/D ratio, yet which also give a higher lift value than the Clark Y. The Grant X 8 is such a section. The R.A.F. No. 32 is another good section in this respect.

# SCIENTIFIC LEADS THE PARADE WITH THESE 3 CONTEST WINNING GAS MODELS

SCIENTIFIC offers you the finest gas models money will buy! Whether you want to compete in flying contests with the best on the field, or have a lot of exciting trouble-free sport flying your own model in your own way—you cannot buy more real value and satisfaction than you will get with your choice of these 3 SCIENTIFIC MODELS.

## RED ZEPHYR

*Champion of France*

MAXWELL BASSETT'S NATIONAL CHAMPION FIRST PRIZE WINNER DETROIT NATIONALS

**Biggest Kit Value Ever Offered in the Gas Model Field!** Wing span 72 in. Length 56 in. Weight (less motor) 2½ lbs.

**EASY AND INEXPENSIVE TO BUILD!**
**THE FINEST LOW-PRICED GAS MODEL KIT OBTAINABLE!!**

This is the kit for the beginner or experienced builder—simplicity of construction combined with extraordinary efficiency. Includes a pair of 3½" PNEUMATIC RUBBER WHEELS. Completely Printed Wood including ribs, bulkheads, wing tips, rudder sections, etc., with selected strip Balsa in long lengths, liberal quantities of bamboo covering paper and colored tissue for decoration, FINISHED HARDWOOD PROPELLER, landing gear with SCIENTIFIC brackets, all necessary nuts, bolts, wire, electrical connections, etc. Full assortment of supplies, such as sandpaper, cement, etc. Two large full size plans showing and explaining every detail so beginners can complete this model quickly and successfully. This is the finest value ever offered in a gas model—a real record breaker anyone can build. Ask your dealer to show you this remarkable kit, or send your order direct. Satisfaction guaranteed. Complete kit only..... **$6.95** Postpaid Less Motor

## MISS AMERICA

**1st Prize Winner I.C.M.A.A. Contest**

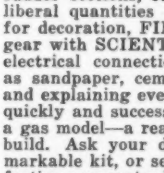
Miss America won first prize in the 40 sec. limited event at Hadley Field, May, 1937. Another Miss America won Grand First Prize at Metropolitan Gas Model Meet. This is a reliable, consistent performer and holds its own at every model gathering. Designed by one of America's foremost designers. Kit includes 3½" pneumatic rubber wheels, finished hardwood gas model propeller and is complete with every item required. Ask your dealer to show you Miss America, or send your order direct. COMPLETE KIT ..... **$9.50** Postpaid Less Motor

## MISS PHILADELPHIA

Wing span 96 in. Length 57 in. Weight (less motor) 3½ lbs.

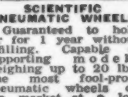
An absolute duplicate of the model which took First Prize at the 1937 Detroit Nationals. Designed by a famous contest winner and offered by SCIENTIFIC so all Model Builders can have a perfect duplicate of this prize winning model. Kit is 100% complete and includes ready shaped leading and trailing edges with notches cut for ribs; fully finished 14 inch propeller; 3½ in. pneumatic rubber wheels; finished Balsa ribs with notches for spars. Crashproof landing gear; flexible wing supports; high wing stability; beautiful blue and yellow coloring. Can be powered with any standard gas engine. A sensational model easy to build with this complete SCIENTIFIC kit. Ask your Dealer or order direct. **$9.95** Postpaid Less Motor

## SCIENTIFIC GAS MODEL SUPPLIES BUILD BETTER MODELS AND SAVE MONEY!!



**SCIENTIFIC PNEUMATIC WHEELS**
Guaranteed to hold air for 1 year without refilling. Capable of supporting models weighing up to 20 lbs. The most fool-proof pneumatic wheels on the market—at a low price. Per pair—$1.50.


"MADE LIKE A WATCH"
Small size, weight 2¼ oz. Adjustment 0 to 120 seconds. Silver contact points, vibration proof, accurate. Easily mounted in any position. Each.....$3.00



TOGGLE SWITCH
Superior type for gas models; will not stick. Each .....39c

**DeLUXE METALLIC GRAY GAS PROPS**
Most beautiful props obtainable; finished with 8 coats Buick Metallic Gray Auto Enamel, hand polished to a Hi-Gloss finish. 13-14 in. Each $1.75

**TRU-PITCH GAS MODEL PROPS**
Accurately carved with hole drilled made of clear, hard wood in 13 and 14 in. sizes. Look for the name "SCIENTIFIC TRU-PITCH" stamped on every prop. Each..... **99c**

If your motor is sluggish use this Coil and get new pep and power. Each .....$2.50

**BIG SHOT COIL**
For large models; takes more volts. Each .....$3.50

**BROWN JR. COIL**
Finest quality made. Each ...$3.50

**BALSA WOOD FOR GAS MODELS**

**STRIP BALSA**
**6 ft. long**

| | |
|---|---|
| ⅛x⅛ | .02 |
| ⅛x¼ | .04 |
| ⅛x⅜ | .06 |
| ¼x½ | .06 |
| 3/16 sq. | .04 |
| 3/16x½ | .08 |
| ¼x¼ | .06 |
| ¼x⅜ | .08 |
| ¼x½ | .10 |
| ⅜x⅜ | .10 |
| ½x½ | .12 |
| ½x¾ | .15 |

**SHEET BALSA**
**5 ft. long**

| | |
|---|---|
| 1/32x2 | .10 |
| 1/32x3 | .15 |
| 1/16x2 | .12 |
| 1/16x3 | .18 |
| ¼x2 | .15 |
| ¼x3 | .20 |
| 3/16x2 | .18 |
| 3/16x3 | .25 |
| ¼x2 | .20 |
| ¼x3 | .25 |
| ½x2 | .25 |
| ½x3 | .35 |

**RUBBER FUEL LINES**
For all engines.
6" .....20c
12" .....35c

**FUEL TANKS**
Brown Jr. Type for all Engines. Each .....$1.50

**EXHAUST MANIFOLD**
For Brown and Mighty Midget. Each .....$1.00

**SPRING WIRE**
1/16" 3 ft. 10c
3/32" 5 ft. 15c
⅛" 5 ft. 25c

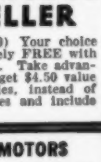
**BAMBOO PAPER**
Finest quality. 24 x 36 in. sheet.
Per Sheet.. .07
5 Sheets .. .30

## FREE GAS MODEL PROPELLER

Real TRU-PITCH Prop. (Value $1.50) Your choice of 13-14-15 or 16 in. size, given absolutely FREE with every order for $3.00 or more in Supplies. Take advantage of this BIG FREE offer NOW and get $4.50 value for only $3.00. (Order $4.00 in Supplies, instead of $3.00 and we will prepay postage charges and include FREE Propeller.)

**FULL STOCKS ALL POPULAR MOTORS**

**OHLSSON** Radial Mounted $18.50 | **BROWN JR.** Model "B" $21.50



**Mighty Midget** Construction kit. Complete $9.85 Complete Engin, Ready to Run—Now Only $14.00

**Gwin Aero** Construction kit. Complete $11.35

IMMEDIATE DELIVERY on the famous "ELF" gas motor. Price $21.50, plus $1.00 for handling and special partitioned box.

All Engines Sent Postpaid

HARDWOOD PROPELLER FREE WITH EVERY ENGINE PURCHASED

**KNIFE SWITCHES**
2 Pole, Each 25c
3 Pole, Each 35c

**Valvoline Motor Oil**
Finest grade oil for use in miniature gas engines. Per Bottle .....20c

**A. C. Spark Plugs**
For quick starting and dependability. Each .....75c

**Brown Jr. Spark Plugs**
Still the finest spark plug made. Formerly $1.50 now only .....$1.00

**HURLEMAN SPARK PLUG**
Comes apart for cleaning. LEAKPROOF. Each.... $1.00

**NEW CHAMPION SPARK PLUG**
Each .....65c

**ZEPHYR SILK**
Strong and light. Finest grade silk for Model Airplanes. Per yard.....50c

**Condensers**
Light weight. Large or small. Each .....20c

**LANDING GEAR BRACKETS** Pair 50c

**JACK AND PLUG**
Jacks each ....10c
Plugs each ....10c

**NEEDLE VALVES**

Each .....50c


**M & M WHEELS**

| | | |
|---|---|---|
| 1½"; | 1¾"; | 1-1/8"; per pair .....50c |
| 1¾"; | 1⅞"; | 2"; per pair .....60c |
| 2⅛"; | 2⅜"; | 2-5/8"; per pair 60c |
| 3½" | formerly $3.50, now $2.75 | |
| 4½" | formerly $3.75, now $2.75 | |
| 6", pair.....$4.50 | | |
| 1¼"; | 1⅜"; | 1½"; 1⅝" in. Per Pair .....50c |
| 1¾"; | 1⅞"; | 2. 2⅛"; 2½"; 2⅝ in. Per Pair .....60c |
| 3½" | Pair | $2.75 |
| 4½" | Pair | 2.75 |
| 6" | Pair... | 4.50 |

**SCIENTIFIC GAS MODEL FINISHES**

The finish on a gas model does a great deal in making a successful model. Don't take chances with inferior low-priced finishes.

Clear Nitrate Dope, Colored Nitrate Dope, Nitrate Thinner, Gas Model Cement, Regular Cement, Bamboo Paper Cement Banana Oil.

| | |
|---|---|
| 3 oz. bottle | .25 |
| ½ pt. can | .50 |
| 1 pint can | .75 |
| 1 qt. can | 1.40 |

**HOOK UPWIRE**
Absolutely oil, gas and water proof. Coil of 5 ft. .....20c

**Doughnut Rubber Wheels**

| | |
|---|---|
| 1" diam. Each | .8c |
| 1¼" diam. Each | .9c |
| 1⅝" diam. Each | .10c |

**MODEL DEALERS**
Get in on this new business of gas model Kits and Supplies. Order the Complete SCIENTIFIC line at your regular discount or, if you are not already a SCIENTIFIC dealer, write today on your letterhead and get full details.

## SCIENTIFIC MODEL AIRPLANE COMPANY

218-220 MA-11 Market Street, *"GAS MODEL HEADQUARTERS"* Newark, N. J.

In France: E. Kruger & Co., 9 Rue St. Sebastien, Paris
In England: H. & S. Norman, 46 Derby Rd., Kirkhams, Prestwich, Lancs.
In Australia: Swift Model Aircraft, 155 Adelaide St., Brisbane, Queensland.
In South Africa: Stratosphere Model Aircraft Supplies, P. O. Box 3248, Johannesburg.

**HOW TO ORDER**
Add 15c to orders up to $1.50. On orders over $1.50, add 10% of order. Orders amounting to $4.00 and over are sent postpaid. All SCIENTIFIC Kits and Gas Motors are sent postpaid. All orders shipped same day they are received.

Sometimes it is advisable to select a section with a slightly lower L/D ratio because the lift value of the section is so large that it more than compensates for the small loss of efficiency involved. In such a case the gliding angle would be steeper but the sinking velocity would be less than the section with the higher lift—drag ratio.

If your ambition is to design and fly duration models, do not let inexperience deter you. Design your plane according to the proportions given here and you will be pleasantly surprised at the results of your first attempts. Experience gained through practice will eventually give you the added advantage required to produce a record breaker.

Next month the problems involving gas model design will be discussed.

## Build This World Record Speed Job

*(Continued from page 19)*

sheet for bulkhead No. 11. The method used in construction is a modification of the well-known half-shell type of construction. After all the bulkheads are cut out and notched the left half is laid out directly over the drawing, and left to dry over night. It is then taken up and the right half built on it. This method requires that you be prepared to finish the fuselage after taking up the one side. A piece of ⅛" flat is glued to the front of the tail boom and trimmed to fit into the rear of the fuselage proper. A safety hook is inserted in the boom and glued securely; note the washer between the hook and the bulkhead. Now we are ready to fill in the portions noted on the drawing. These spaces should now be filled: between bulkheads Nos. 1, 2 and 3; around the wing slot; between bulkheads 10 and 11; and between 11a (front of boom) and 12. The bottom of the wing slot should fit the bottom of the wing and set it at 0° incidence. We glue small pieces of sponge rubber in the front of the wing slot for protection of the bulkhead and wing on hard landings. The ⅛" laminations for the nose block should now be glued lightly to the front bulkhead and the whole fuselage sanded so that there are no bumps or rough places. The landing gear should be put in before the fuselage is covered. It is bent to shape and glued and wrapped with thread. The landing gear may not seem to extend into the fuselage far enough, but we have found that a stronger method of attaching, while better to think about, does more damage than good, for when the ship crashes, or, as one of ours did, flies full speed into high weeds, there is slight damage with it the way it is, but with a stronger method of attaching, the whole front of the fuselage will go. The wheels are made of two pieces of 3/64" flat basswood glued cross-grained and well streamlined. All the filled-in places should be given one coat of dope and the nose block several. Before covering, the noseblock is removed and a piece of ⅛" flat glued to it to fit into bulkhead No. 1.

The tails are the last of the parts to be made. Their simplicity is apt to make the model builder a wee bit careless, but this must not be, as the tails are really the most important factor in attaining straight flight and a slight bit of carelessness may be the cause of complete disaster, which is not impossible with such a small ship and so much power. The materials used consist of 12 pound 1/16" sheet and 1/16" square balsa. The outlines are made of 1/16" sheet cut to shape and the spars and ribs are 1/16" square. After they are laid out and let dry they should be turned over and glued on the bottom side. This process will prevent a great deal of warping, which is a natural tendency with such thin surfaces. They should then be carefully sanded to a streamline shape.

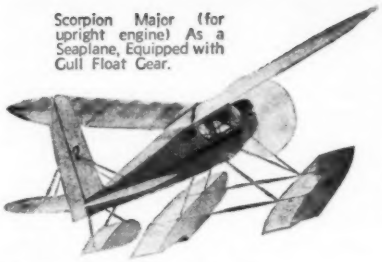
The wing and tails should be covered first and the scraps of paper left can be used on the fuselage. We use colored tissue on all our models, for it gives decoration and light weight as well. The paper should be cemented to each rib, then the surface sprayed with water and doped with thinned clear dope. This applies to the wing and tails, but the fuselage must be covered with small pieces which fit the spaces between stringers and bulkheads and should be given two or three coats of thinned clear dope. By thin clear dope we mean regular nitrate dope mixed with an equal part of lacquer thinner. The wing and tails must be watched very carefully as the thin surfaces warp with little or no reason.

After the model is completely covered the parts should be assembled. The stabilizer is cemented to the middle stringer and should have 0° incidence. The fin is cemented directly to the stabilizer with no offset. The wing slot, as mentioned before, is sanded to fit the wing and to give it 0° incidence. The wing is held on by ⅛" flat rubber and a wire hook which is bent to fit the bottom of the fuselage. These rubber bands should be as tight as possible to prevent any movement of the wing while the ship is in flight.

Last, but far from least, comes the propeller. This is carved from a basswood block ⅝" x 1" x 7½". It is carved in the usual sweep-back manner, leaving the hub about ⅜" deep by ¼" wide, the thickness of the blades tapering from 3/16" near the hub to 1/32" at the tips, which are rounded off to give a pleasant shape to the blades. The final finishing consists of three coats of clear dope with intermediate sanding with No. 240 Wet or Dry paper. The use of basswood comes from our experience with both basswood and pine propellers. The power, by the way, ranges from 16 strands of ⅛" for distance, for long courses, to 30 or more strands for short courses.

We now come to the third, last, and touchiest of the important points, the flying end. We take the completed ship out to a field in which the grass or weeds are over a foot deep. The "crate" is hand-wound and hand-launched at a considerable angle of climb. This procedure is repeated until a straight climb is obtained, which means not a loop or a leveling out before the power quits, but merely following the line on which it is launched. After this part is conquered, we go to where there is as little grass as possible and, with the aid of a platform about a foot high, R.O.B. the model into the wind, gradually increasing the number of turns until control is good when the motor is fully wound. It

# WORLD FAMOUS BUNCH MOTORS & AIRPLANES



Scorpion Major (for upright engine) As a Seaplane, Equipped with Gull Float Gear.

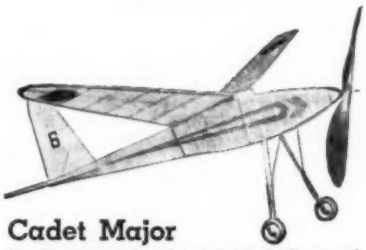
## Gull Float Gear

Discover a new world of gas model thrills and equip your present ship with the Bunch Gull Float Gear. Any 3 to 6 lb. model easily operated over lakes or bays. Exhaustive tests prove successful take-offs and landings. All balsa construction, fabric covered. Total weight, 12 oz.

**Master Kit**—All materials to build, waterproof and install on any airplane, postpaid **$6.75**

**Dry Kit**—Less chemicals, strut wire and fabric.....postpaid **$3.00**

Plans and full instructions only.....postpaid **50c**



## Cadet Major

A rubber-powered model that has justly earned renown as the world's outstanding duration model. Original fuselage design controls slipstream to give winning contest performance. Kit, complete with 30-in. tapered wing, rubber lube, carved prop, and freewheeler.....postpaid **$1.50**

## Cadet Junior

Worthy companion of the Cadet Major, you will be amazed at the flights of this 20-in. truly contest style airplane. Also includes rubber lube, carved prop, turned balsa wheels and freewheeler.....Price **50c**

Plus 10c postage

**SPECIAL**—Both kits, Cadet Major and Cadet Junior.....postpaid **$2.00**

## Super Scorpion

The unexcelled flying records of this rubber model established the basis of the Scorpion Gas Model design. Easily built and adjusted, the cabin-type Scorpion flies in all kinds of weather, can withstand any flying abuse, postpaid **$1.00**

## Canary

A 12-in. fuselage model with built-up "Gull" wing design. The Canary is capable of pursuit style flights, indoors or outside.....postpaid **25c**

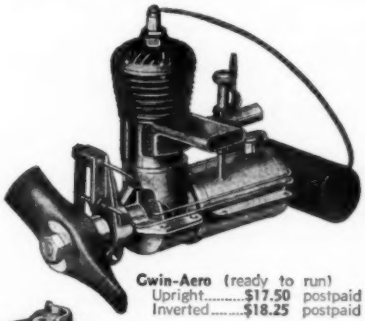
## Baby R.O.G.

The latest improved version of the world's famous beginners' model. Each kit contains materials to complete two airplanes. Carved prop and detailed instructions make this the simplest rubber-powered model that really flies.

postpaid **25c**

## BUNCH MOTORS

Thoroughly engineered and established on regular first-line production, the Gwin-Aero and Mighty-Midget are the world's greatest motor values today. Unequalled in any respect, these engines owe their tremendous popularity to such exclusive Bunch features as: compression-sealing **Piston Rings**, aircraft steel and aluminum alloy construction, and precision manufacturing to the narrowest limits. A new hi-dome piston assures greater compression and guarantees more power than any engine of similar displacement.



**Gwin-Aero** (ready to run)
Upright.....**$17.50** postpaid
Inverted.....**$18.25** postpaid

All Bunch Motors **Piston Ring** equipped with the new Hi-Dome Piston.

**Mighty-Midget** (ready to run)
Upright.....**$14.00** postpaid
Inverted.....**$17.25** postpaid

PRECISION FINISHED PARTS

**Bunch Motor Kits.** Save money and order the Mighty-Midget or Gwin-Aero Kit that suits your purpose. All parts machine finished and taken directly from our assembly line. We guarantee factory-built performance when you follow enclosed step-by-step instruction manual.

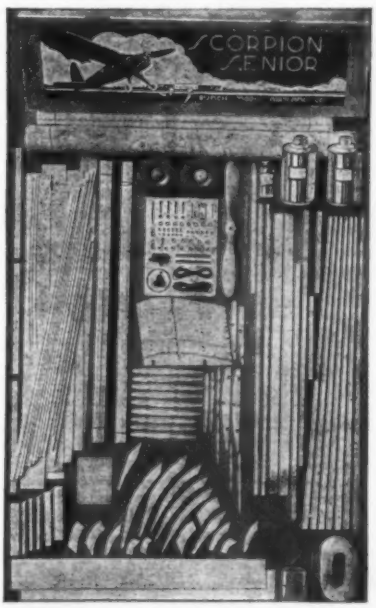
| Upright Engine Kits: | | Inverted Engine Kits: | |
|---|---|---|---|
| Mighty-Midget | $ 9.85 | Mighty-Midget | $10.10 |
| Gwin-Aero | $11.35 | Gwin-Aero | $11.60 |

**WHEN ORDERING SCORPION MODELS, specify Scorpion Senior (inverted engine) or Scorpion Major (upright engine).**

Scorpion Senior (for inverted engine) built as illustrated from a Bunch kit.

## 2 New Scorpion Gas Models

The Scorpion Senior and Scorpion Major are the last word in high-performance, cabin-type gas models; 57-in. wing span, 41 in. over-all. Structural and aerodynamic engineering is carried out to the highest degree, and is attested by thousands of perfect flights.




Constructed entirely of balsa, all Scorpion Kits contain: cut balsa wing and tail ribs and tips, cut tapered spars, shaped leading and trailing edges, formed real piano wire landing gear, full engine cowling, vibration-dampening motor mount skids, movable battery mount on beam structure that absorbs major landing stresses.

**Master Kit.** Includes above features, plus "Autoknips" flight duration timer, Bunch pneumatic air wheels, hand-carved and varnished prop, shaped balsa motor cowl, bamboo paper covering with adhesive liquid, full pt. regular cement and 1 pt. nitrate dope and decorative material. Also switches, terminals, ignition wiring and all fittings to install motor and prepare model for flight.....postpaid **$10.50**

**Standard Kit.** Same as Master Kit, less carved prop, duration timer, wheels, ignition wiring, switch and terminals.....postpaid **$6.95**

**Dry Kit.** Same as Standard Kit, less cement and dope. Motor cowl blocks instead of shaped cowling.....postpaid **$4.95**

Plans and assembly instructions only.....postpaid **50c**

**Order any of the guaranteed products on this page direct, or from our numerous dealers. Enclose postal money order for purchases over $1.00.**

**Send 3c stamp for illustrated rubber-model catalogue.**

## BUNCH MODEL AIRPLANE CO.

5009 SOUTH HOOVER STREET, LOS ANGELES, CALIFORNIA

**British Agents: Model Supply Stores, Sales Depot and Showroom, 4 Stewart St., Deansgate, Manchester, 3**

ing the number of turns until control is good when the motor is fully wound. It might be well to state that we believe the tails are the best control surfaces, giving better control with less drag than if the wing were warped for adjustment.

As a last word we want to say that if care is used in the construction, and common sense in the flying, we are very confident of the results you will get with this speed plane.

## The Orient Takes to the Air

*(Continued from page 5)*

hit any of their own people, they say it was time for them to die, anyway. Oh, the jewel of the lotus!

Besides, almost none of their planes are the type best suited to the type of operations demanded against the Japanese. The latter are holding pieces of towns, houses, barricaded streets and trenches, and they are supported by small river gunboats. What the Chinese need for work against such adversaries are large numbers of fast attack planes and dive-bombers. That is just what they haven't got, and that brings us to an examination of what they have.

According to the best information available, Mme. Chiang's force had about 400 first-line planes in June, just before the trouble started. These were divided into two main groups—Italian planes brought in by the Italian mission, and the American, which came in as a result of Jouett's mission.

The Italian ships are the Breda 25, Breda 27, Caproni 111, Fiat CR32 and Savoia S72. Of these the Breda 25s are the most numerous. They are a training biplane, pretty slow for war purposes, but very sturdy, reliable (ships of this type have twice won the Tour de l'Europe) and good stunters. In war service they would probably be most useful as observation craft, but unfortunately the Chinese have not much heavy artillery to observe for, and when the Breda 25s have appeared in the fighting it has been as light day bombers, for which they are not altogether fitted, not carrying enough load.

The Fiat CR32 and the Breda 27 are both single-seat pursuit planes, the former a biplane with the familiar Italian W arrangement of struts between the wings, the latter an all-metal, low-wing monoplane. Both are extremely fast, the Breda a wonderful climber and the Fiat, perfect in a dog fight. They are the best fighting machines in action at Shanghai. Caproni 111 and Savoia S72 are bombers, high-wing monoplanes. The former is a single-motor job, which can carry 5000 pounds to a distance of 800 miles; the latter a huge three-motor ship of great speed, looking a good deal like a heavy Fokker, a great night-bombing ship.

Two things are worth noting about these Italian craft in the Chinese air service. In the first place the Italian mission had not completed its work when the shooting started. The factory at Nanchang was not in shape to run without Italian technical help, and could not produce motors. That means that an Italian-type plane, once hurt, is probably lost to the Chinese for good. The more so since Japan has an alliance with Italy and will probably demand, if she has not already done so, that the Italian mission pull out.

The other thing worth noting is that these machines are built for the Italian system of air tactics. That is, the bombers are not expected to do any fighting, even to protect themselves. Their job is carrying bombs; they look to the accompanying pursuit to keep them safe on such missions. In turn this means that the Italian section of China's air force cannot use its fine, fast pursuit ships for chasing Japanese bombers away because it needs them to cover its own operations.

In the American section the story is altogether different. The mission completed its contract in 1935 and Col. Jouett went home, but a good many of the pilots and some of the mechanical help remained behind at the Chien Chiao factory, which was turned over to the Chinese at that time. The factory has been improving steadily and the outbreak of hostilities found it capable of repairing any American-made ship in Chinese service besides having a production capacity of some 75 planes a month. This figure sounds excellent but is slightly deceptive; the plant as operated at the turn of the year was an assembly unit for the Northrop light bombers shipped from the United States in parts and had no other source of supply for many of these parts, besides, being quite incapable of building motors. Indeed all Chinese airplane motors must still come from abroad.

These Northrops constitute the backbone of the Chinese air service. There are more of them than any other single type; the low-wing, two-seater bomber, with a speed of about 230 m.p.h., a good general-purpose machine, able to stand up in a fight if it has to, even against pursuit, able to carry a good, though not sensational cargo of bombs, and with a good cruising range. They are the more valuable to the Chinese since there are plenty of spare parts for them and a number of adventurous American experts in the Chinese service who know all about the Northrop.

The American section also contains a fair quantity of Curtiss Hawks, mostly of the older type, but which have been reconditioned and have received new engines at the Chien Chiao factory. The

Hawk is a very good ship and with the repair work that has been done on them this lot counts as first line planes, better than anything the Japanese can bring against them along the Shanghai front. What is more the Hawks will probably stand the wear better than the more delicate Italian craft, thanks to their lower landing speed and general sturdiness.

In addition, the Chinese count among the first-line planes a few Vought Corsairs of the type used by the U.S. Navy as shipboard planes and a number of Consolidated advanced training machines. Both are useful as reconnaissance machines and light bombers, and, given good handling, have proved quite capable of standing up to anything the Japanese have produced so far. Behind them are a large number of distinctly second-line ships, a few old French Breguets and Ford Trimotors, and some Stinson Detroiters, which the Chinese would throw into action in a pinch.

This completes the list of the strictly military Chinese planes, but they seem to have made a good haul out of the civil air lines operating in that country, all of which were taken over by the Central government when the fighting started. The best pickings came from the China National line, which had just been outfitted with a complete set of Douglas DC2s. Several of the American pilots flying these splendid machines have been reported as accompanying them into Chinese service. A very minor amount of alteration would convert these ships into magnificent long-range bombers, quite equal to the Savoias in speed, capacity and maneuverability. The South Western line, though backed by British money, was also outfitted with American ships, in this case, Stinson Reliants. They are not quite so good for war purposes as the Douglas, but still very useful, the more so since the pilots are all Chinese.

The Eurasia air line also furnished an important addition to the Chinese cause. This commercial company was all fitted out with Junkers Ju52s and W33s, planes which have convincingly demonstrated that they could act as bombers in Spain—not very fast, but rugged, excellent weight carriers, able to fly over mountains, and well arranged for gun mounts. Their pilots and shop equipment, including a motor-repair factory, the only one in China, are reported to have entered the Chinese service. This is an important reinforcement, as the mechanics are mostly Germans who know their business, and many of the pilots are said to be White Russian adventurers, good flyers, very reckless and daring.

There is more help on the way for the Chinese, too. Just as hostilities broke out a big shipment of Bellancas, forty or fifty planes of the most modern types, had sailed from the United States. Since then, Japan has announced a naval blockade of the Chinese coast, however, and there is a good probability that these Bellancas will never fly for Chiang. On the other hand Japanese official sources say that 216 Russian planes are on the way with more to come. All these are described of the very best and most modern type, big ANT four-motor bombers, and the snub-nosed "Chato" pursuit planes built on Boeing lines. The latest report available said 72 of these planes, the first shipment, had arrived in North China, and were being flown down to Shanghai by their pilots, who were to enter Chinese service. If they do get there they will certainly make as much trouble for the Japanese as they did for Franco's people in Spain, for the Russian ships are good and their flyers are well trained.

The total picture is that of an air force plunged into a first class war with a multiplicity of different airplane types and with aviators young and enthusiastic, but not too well trained. The whole force is strong in bombers, but it lacks pursuit, having only enough for indispensable protection work, not enough to fend off enemy air attacks, and it altogether lacks attack planes and the new type of heavy four or five-seater fighter.

The first-line ships are as good, or probably better than anything the Japanese have, but there is a lack of spare parts, especially of motors, of replacements and repair shops. The Japanese have been bombing the Italo-Chinese factory at Nanchang, and they are bound to get after the others. Unless more help comes from foreign countries, there is a strong probability that the Japanese will win simply by wearing out the Chinese machines.

And all the early reports seem to agree that this is about the only method by

which the Japs will succeed in winning the war in the air. For some odd reason the Nipponese do not seem to make good aviators; perhaps this is because they have been in such a hurry to build up a flying service that the tests for admission to it have not been made rigid enough. At all events the Japanese air service looked bad in the earlier mess at Shanghai several years ago and there have been rumors that it has looked just as bad in maneuvers held since. In view of the country's openly-stated military ambitions, there has been a tremendous effort in recent years to remedy the defective spots. Prizes have been offered for flights, commercial air lines established with government money, newspapers and private citizens have opened big public subscriptions to buy more airplanes, free training schools have been established, foreign planes bought and copied.

Yet in spite of these efforts the Japanese air service seems to feel a little uncertain of itself. In the offensive at Shanghai their planes persistently bombed targets that were in easy range of the artillery, who could have destroyed the same targets much more easily and cheaply; and the only possible explanation is that the Japanese high command wanted to see how well their machines could do at hitting the mark under wartime conditions.

In spite of the evident desire to make the Chinese war a kind of guinea pig on which to test their improving air force the Japanese have sought aerial combat as little as the Chinese. There must be a reason for this too, and it seems to lie in the fact that in central China, especially on the Shanghai front, where the greatest aerial activity has taken place, the Japanese have been unable to get into action with anything but seaplanes and a few light and slow land machines with low landing speeds. Indeed, the whole story of the early weeks of fighting was that of constant and persistent efforts by the soldiers of the Flowery Kingdom to get ashore and clear out enough country to give them a good land base on which to establish an airdrome. Once they get this they will be able to put down the smaller Chinese air force under pressure of numbers; until they do get it, they will be fighting landplanes with seaplanes, a combat which is always to the advantage of the former.

Doubtless the Japanese could have gained the upper hand fairly easily by bringing their navy aircraft carriers over from Japan and throwing the three hundred or more planes from their decks into the conflict. But the Chinese and White Russian bomber pilots have shown themselves so very daring and skillful that the Japanese are apparently afraid they will lose a carrier or two if they try it, and in the present state of international relations the loss of so important an element of the battle-fleet could not be afforded.

Just how many and what type of machines the Japanese are bringing to bear from the water is a question no one can answer with accuracy. No nation has been more secretive, and the few details we have only confirm the opinion that we really know very little. The story of what the Japanese air force is today has to be built up from three sources—official announcements, photographs of Japanese planes and comparison of their performances with those of the Chinese craft they have been fighting.

The official announcements are all smooth as silk, of course, but one can spot a few facts by reading between the lines. The most recent, just before the Chinese fuss, was that the first all-Japanese plane had been put into production. It is a craft designed by experts of the Tokyo Imperial University, and is described as a giant bomber, with a wingspread of 90 feet and propellers 12 feet in length, so large that a whole electric system had to be taken down to enable the first one to fly off the field where it had been constructed. "Work on it has been going on," the statement continues, "since 1934. An improved air-intake system will replace the usual supercharger. 500,000 yen have been spent in designing the engine."

All this adds up to the story of a rather fumbling effort, and it is evident that if the first all-Japanese plane is just being put into production the planes Nippon actually has in the air are not all-Japanese. This impression is confirmed from photos and what is known of Japanese planes; mainly that they are copied from foreign types, often two or three foreign types at once, a wing from one, the fuselage from another and the machine-gun turret from a third. And if it has taken

them three years and 500,000 yen to produce an engine for the new monster, this can only be because they don't know a great deal about designing engines. This impression is partly confirmed by performance in the Chinese war where the Douglases and Bredas have run rings around the Japanese craft; but again, this may be partly due to the fact that the Japanese have been using seaplanes.

It does not do to underestimate the Japanese air force for this or any other reason. They may learn by making mistakes but they do learn. They have more planes, better ones, and better flyers than they had two years ago. They have unlimited courage and unlimited determination; when they start out for an objective, they either reach it or get killed trying. They may not be able to design planes of their own, but they are so good at copying others, that it is often impossible to tell the copy from the original either in appearance or performance. And in this manner they have copied some very good models, notably the Fokker long-range bomber and the Hawker Fury.

In other words the Chinese have the best planes at the fighting front, but they have no place to build more and no way to get them except from Russia. The Japanese have the best planes, but they can't find any place to fly them from; both sides are bombing everything to pieces, and what the end will be nobody knows.

## An Experimental Twin Tractor

*(Continued from page 11)*

been drawn. Note the tab on the bottom of each rudder; the two are integral. Now streamline the rudders, round off the leading edges and bring the trailing edges to a point. Round off the edges of the tabs. The tabs fit into the slots at the end of the bodies, thus aligning the tail. The rudders are finished down with ten nought sandpaper, doped, sanded again, and covered with tissue, the grain of which runs at right angles to the grain of the rudders, i.e., horizontally. One piece of tissue is doped to each side of each rudder. This will strengthen and improve the appearance of the rudders.

### Fuselages

There are two separate bodies to be constructed. The construction is very simple and interesting if the proper procedure is taken. If more attention is to be paid to contest flying, then it is suggested the landing gear be eliminated since its elimination will make the model fully one half ounce lighter, as well as eliminate extra drag. Thus two identical fuselages may be made with no attention having to be paid to the left or right side. However, the instructions will describe the construction of the model with the landing gear.

Each fuselage is begun by cutting a center blank, 2 in all, from a sheet of 3/8" medium hard balsa wood. All the dimensions are shown on the plan at the bottom of plate 1. To make the sides, obtain two identical sheets of 1/8" x 2" x 36", identical in size and hardness, (medium hard). Lay out each piece as follows: From opposite ends and on opposite sides

lay off 26" from the ends, two 5/8" lines at right angles to the edges of the wood, as shown. Connect the inside ends of the lines by a line running diagonally the length of the piece. We now have the divisions between the two sides and also their lengths laid out. The rest of the dimensioning may be taken off the plans. It shows the proportions of the front part of each side. Note that when the four sides are finished, there will be two pieces as shown on bottom and two as on top. Cut away the shaded portions which are scrap. The sides are now glued to the center blanks. Make one left body (with the broken piece on the left and the whole piece on the right) and one right fuselage with the broken piece on the right and the single piece on the left. Hold in place with pins till dry. Note the curve on top at the tail due to the taper. Also note that the tops of the center blanks and the tops of the sides are flush. At this point it is an excellent idea to build the landing gear which is integral with the fuselages. See the lower left of plate 2. Cut 2 main pieces "A." Note that the hollow for the wheel which is half as deep as the pieces are thick (1/16" deep) is on opposite sides on the two pieces. Cement piece "L" in place on the left body and piece "R" on the right body so that the hollows are facing outside. Now cut 4 pieces "C" with the opening running right through and make two sets of 2 each glued together. Glue each set of 2 to each piece "A" in the appropriate position so that they face the outside. Now cut two more pieces "C" only with the hollows running halfway through like on "A." Make one left and one right and glue to the corresponding landing gear, so that we now have a hollow 3/8" wide on each wheel pant. To give the axles for the wheels a stronger support than just 1/16" on each side, we glue a piece "B" of 1/16" sheet on each side of each landing gear, 4 pieces in all, and the axles now will have 1/8" support on each side. All these pieces are cut from 2" wide balsa held at an angle. Now cut a 3/8" sq. medium hard strip so that it reaches from the top of pieces "C" on each pant flush with the leading edge of piece "A" and up to the top cutting it flush there. It is then glued in place against the side of piece "A" and on top of pieces "C". Running from the top rear edge of this strip to the back of piece "A" along piece "A" and flush with the top of the fuselage cement another 3/8" sq. piece as shown. Now glue the 1/8" sheet rib in place in the middle of the hollow panel back of the vertical strip. Glue a strip of 1/8" sq. in the corner formed between the 3/8" vertical strip and the front side. When all these pieces are dry, carve them down to the approximate streamline shape shown in the various perspectives. Now cut a groove 3/32" wide by 1/32" deep all around, the hollow panel to be covered with 1/32" sheet balsa. Cut a panel to shape and glue it in place covering hollow point. This construction keeps the weight of the landing gear down.

The landing gear may now be finished down as shown in the perspective in the upper left hand corner of plate 2. The rest of the fuselages is now finished down to the cross-section shown in plate 1, upper left. The final sanding is ten nought sandpaper. Note that the tops of the bodies near the tail are flat to accommodate the elevator. Note the small stop blocks which are glued into notches cut for them and then streamlined. The guide rails may now be glued in place and held with pins till dry. (Note cross-section in A-A.) Now cut 2 cross braces as shown in plate 2 upper left, of hard 1/16" x 5/8" balsa 11" long. Note the circles and cross hairs on the bodies showing where to cement them. Cut slits at these points. Do a good job of gluing these braces in place and apply a heavy cement skin at the joints. True up with a triangle. Note the details of the nose and glue the 1/8" sq. strips in place.

Now cut two nose plugs as shown. The plug is 1/2" long while the front end is 1" long. Cut the plug out of the block first, then slip in place in the nose, then carve the front end right on the plane to give it a molded appearance. Drill a hole for the prop shaft and insert a long bushing in front and one in back. Bend two tail hooks as shown on the side view, (.034 music wire,) protect with rubber tubing. Insert the center piece. Drill a few small vertical holes around the tail hooks in the centerpieces and then run a needle with thread down and around through the holes, passing around the back part of the hook binding it in place. Then apply a cement skin. Now cut 2 sub-rudders of 1/8" hard sheet balsa and cement in place as shown in middle right plate 1. Cut V grooves around the bottoms and cement some 1/16" round bamboo or reed in the grooves. When dry trim the fins, rounding the sides and smoothing them. Cement the 1/32" sides in place leaving 1/16" between them making the slots for the rudders.

When everything on the fuselages is shaped and smoothed, apply 2 to 3 coats of banana oil with intermediate sandings of ten nought sandpaper. The wheels

may now be made as on the plans, and inserted. Use pins for axles. The wheels are given 2 coats of dope and 2 coats of colored dope.

The propellers are now carved from 2 blocks of 1" x 1½" x 10" and carved according to the usual procedure. Make one left-handed and one right-handed propeller. Give them 3 coats of banana oil and one to 2 coats of silver dope. Use any proven free wheeling. The right-hand prop is put on the right fuselage, the left-hand prop is put on the left fuselage. Use 8 to 10 strands of ⅛" flat brown rubber well-lubed.

Cover the wing and tail with Japanese tissue. Try to use some red tissue for visibility. Spray with water and apply 2 coats of banana oil when dry. Cut away some of the tissue from the 3 $\frac{1}{16}$" ribs on the elevator, and glue the rudders in place; see that they are perpendicular. Bend 2 wing clips as shown in plate 2, right, using .034 music wire. One is slipped inside each fuselage with just the prongs showing, and facing the center of the plane. They should fit snugly. They should be located about 7" back from the nose. Slip one ⅛" flat rubber band around each wing half and slip it around the corresponding wing clip. The wing will now be held securely. The tail is held in place with rubber bands. Note the notches on the fuselage side view. Bands fit around elevator passing over end rudders and into notches. Rudder tabs fit into slots in sub-rudder.

The prop shaft is of .034 music wire. The rubber hook is protected by rubber tubing. Note the wind up hooks in front of the propeller, eliminating "S" hooks. Use several large bronze washers or ball bearings for the prop bearings.

### Flying

The model may circle in either direction. There is no torque. Have a helper hold the tail end of the fuselages. Use a powerful twin-winder. Remove both nose plugs and insert wind up hooks in winder and wind up 650 to 1000 turns in each motor. Stretch the rubber well. Use about 4" slack or more. If the tension of the rubber is too great for the required winds have two persons, each winding up one motor, the same number of winds of course. Launch by gripping bodies back of the landing gears and holding propellers against the knees till the right moment. The nose slightly up and thrust forward into the air. Start adjustments with the wing slightly back of where shown on the plan. The model should soar up gracefully into a high climb, "reaching for the cumulus clouds."

## Slants on Wind Tunnel Design

*(Continued from page 31)*

formance of the complete airplane.

In Figure 2 is illustrated a typical airfoil set-up in the wind tunnel. It may not be noticeable, but the model is mounted in an inverted position. This is done so that the resultant forces acting on the model may be transmitted directly upstairs to the balance room by the simple wire suspension method. The ultimate effect on the model is the same regardless of its position. The wires "A" are the lift wires and are connected directly to the front and rear lift balances, whose sum records the total lift acting on the model. The yoke "B" transmits the drag force acting on the model to the drag balance. The wires "C" are connected to counterweights which hang below the floor of the tunnel; these weights put tension in all the wires and prevent the model from vibrating too much in the windstream.

In performing a test the airspeed is kept at a constant figure, usually 60 m.p.h. or 80 m.p.h., and a series of readings is taken on all the balances through a wide range of angle of attack. A test is customarily started at minus six degrees and run through two degree intervals up to eighteen or twenty degrees, or until the burble point of that particular airfoil is passed. The burble point is indicated by

a sharp falling off of the lift readings and a rapid increase in the drag readings.

Perhaps the next in importance to the above type of test, is that test wherein the performance characteristics of a complete airplane model are determined This may include the lift and drag ratings of the complete model, as well as the degree of stability of the model about all three of its axes. In Figure 3 is shown the type of set-up used in determining the stability of the model about its longitudinal and directional axes; this is known as a roll and yaw test. In other words, it measures the tendency of the model to roll and pitch about these two axes.

The model is supported on the spindle by means of a fitting at "A" which allows the model to freely roll and pitch. The wire "B" is attached to a scale and any tendency of the airplane to roll is recorded on the scale. The angle of yaw is changed by rotating the complete model-spindle arrangement through various angles from right to left. The pitching characteristics are measured on a separate balance. This type of test is a definite check on the major stability characteristics of the airplane, and the data will indicate right away whether the model under consideration will be stable or unstable when it is built. It is thus very evident how valuable data of this kind is to both the engineer and the manufacturer.

As an example of some of the special tests which can be run in a wind tunnel, observe Figure 4. This particular test of the fuselage of an airplane was performed to determine the amount of drag caused by the fuselage alone. The complete airplane had been tested and the drag was far in excess of the value it should have been. So then, the model was broken down into its component parts, and each part tested individually to determine what was causing the high drag. The fuselage was supported by two V wire braces and the wire "A" transmitted the drag of the body to the electric drag balance upstairs. The tunnel was then run at different speeds and a measure of the drag taken at each speed; thus comparative values of the fuselage drag were obtained. The other parts of the airplane were tested in a similar manner and it was a simple matter to determine what was causing the excess drag.

In Figure 4, remember that models are mounted in the tunnel in an inverted position; thus the engine banks project down as shown. A more careful examination will disclose the top of the cockpit near the end of the fuselage.

In interpreting the data from wind tunnel tests, a very important point to remember is that the figures as taken from the balances and instruments are not the final results, but are subject to a sizable amount of correction before being of any value. This is an error that many persons unfamiliar with wind tunnel research are prone to fall into.

Usually the greatest amount of correction to be applied is that due to the drag caused by the wires supporting the model. These support wires have a certain amount of drag which has the effect of increasing the actual drag of the model. Thus, for each experiment, the drag of the wires supporting the model is computed and subtracted from the drag reading obtained for the model.

Another large correction has to be applied to account for the fact that we tested a model of the airplane, and not the full-sized airplane itself. This correction is known as "scale effect." As the size of the model increases, the amount of correction due to scale effect decreases, so that when we test the full-sized airplane, no scale effect correction is necessary. However, as stated before, there are only two wind tunnels in the world which are capable of accommodating full-sized airplanes, so that in the majority of cases a scale effect correction has to be applied.

We must also remember that the walls of the wind tunnel sometimes have an effect on the model, and a correction due to wall interference has to be made. This is particularly necessary in the case of large models that come unusually close to the walls of the tunnel. In the case of a real small model, no correction is necessary since the walls are far enough away as not to have any effect.

Another tunnel correction that sometimes has to be made is due to the fact that the airstream in the tunnel may not be smooth, but may possess turbulence. Every wind tunnel has what is known as a turbulence factor, and the magnitude of this factor determines the amount of turbulence correction that has to be made.

In the light of the above, it is plain that the data supplied by wind tunnels is by no means infallible, and that all wind tunnels have their limitations and short-

comings. In spite of this, however, engineers obtain very valuable data from wind tunnel research, and the science of aeronautics would not be where it is today were it not for the large amount of research that has been done in wind tunnel laboratories. The whole secret in successful wind tunnel work, is to be able to correctly interpret the data after it is obtained. This involves an accurate understanding of the fundamentals of aeronautics, and the corrections which it is necessary to apply to the data.

The intelligent and understanding model builder can make very important use of wind tunnel data. The best source from which to obtain this data is The National Advisory Committee for Aeronautics in Washington, D.C. They carry on many important investigations and publish the results of all these experiments in the form of Technical Reports. These reports may be obtained from Washington at a very nominal charge for each. A complete catalogue is published listing all the reports that are available and their prices. It would pay all model builders to send for this catalogue, and look over some of the reports.

A most important application for the model builder is in the selection of airfoils for a particular model. The N.A.C.A. publish the characteristics of many different airfoils, and by a survey of the relative lift and drag of different airfoils, the model builder will have some tangible basis on which to make a judicious selection of an airfoil for the particular model which he has under consideration.

Then too, reports are published on various design features of airplanes, such as landing gears, tail surfaces, etc., and much of this data would come in mighty handy to the person who wants to take the time to make a careful survey of the results. The design of many a model would be considerably improved if the builder had spent a little time in serious consideration of some of the details before the actual construction was started. Gas model builders in particular should be able to make good use of some of these wind tunnel experiments. Gas models sometimes assume such proportions that the problems involved are comparable to those met in full-sized construction. Careful design and construction not only saves much time and trouble, but also expense.

## Build and Fly the Vought SBU-1

*(Continued from page 27)*

### Covering and Doping

Sand the frame of the model until there are no rough edges or projecting humps. Where you have used filled in or balsa covered construction, apply two coats of *model* wood filler, or three coats of clear dope, sanding between each coat. Then carefully cover the model, using the same color tissue as the part to which it is being applied will be doped. Spray the tissue

**NOTE:** This is the correct firm name of the advertiser on this page. In our October issue it appeared through error as "AY'S MODEL SHOP." →

lightly with water and allow it to dry and tighten.

For doping use a good grade of colored dope, mixed with thinner in the proportion of one part thinner to two parts dope. Apply as many coats as are required to give a good finish. The original model required three coats.

Finally, attach the upper wing and finish the remaining detail.

### Color Scheme and Details

SBU-1's have seen service with the First, Second, and Third Scouting Squadrons and the Sixth Fighting Squadron of the United States Navy. In addition, a number of the new Voughts have been consigned to the Argentine Navy. The individual builder, therefore, has his choice of a number of insignia and color combinations. As given in the plans, the Vought of the 6th Fighting Squadron has standard Navy insignia. All metal parts of the fuselage are gray and all fabric surfaces (shaded part of fuselage, lower wing and under side of upper wing with the exception of the tail surfaces are aluminum. The tail is all white. There is a blue band around the cowl, and the fuselage, and a blue chevron on the top of the upper wing. The top of the upper wing is chrome yellow. The Argentine Corsair is all aluminum with insignia as given on plate 3.

In adding the details note that the pilot tube or air speed head is attached to the right wing strut only. It is shown on the left side for convenience. Outline the fuselage details in India ink.

### Flying

The model will probably turn out slightly tail-heavy because of the long tail. To balance it either dope the propeller, which should be hard balsa anyhow, or add weight to the inside cowl face. Modelling clay is a convenient weight. Six strands of 1/8" rubber were required on the original model which weighed slightly under two ounces.

## Frontiers of Aviation

*(Continued from page 15)*

six machine guns on board. Each of the two gunners sit a small gun turret in the engine nacelles out on the wing and just aft of them are the 1,000 h.p. V-type Allison engines. The turrets are accessible from the long, slim fuselage through the wing, but in observing the small depth of the wing it must be a comical sight to see one of the gunners crawl through on his stomach. They should have a block and tackle to haul them through. Being a pusher the ship should be much more efficient as a lot of horsepower is not wasted by blowing air over the airplane. The Allison engines are very easy to supercharge, and there is no doubt that the XFM-1 will be able to operate splendidly at around 30,000 feet. Cooling of the engines is produced by the use of ethylene glycol.

The entire structure of the ship is of modern, all-metal design with the landing gear, including tail wheel, retractable. Much thought has been given to streamlining and with the use of three-bladed propellers enough disturbance should be created to push the fighter along at the 300 m.p.h. mark with full load. The pilot and co-pilot have extremely good visibility, but if perchance the pilot does not see an attacking plane and the gunner does, the latter can tell him about it via the telephone system located in the ship. The pilot and gunners are also located close together so they may see each other and have complete coördination in time of battle.

The fuel is carried in the wing structure beyond the nacelles, there being no integral tank. The oxygen supply is in tanks, though, and are located in the fuselage where they can pump air into the pressure-tight compartments, insuring the crew against unconsciousness at high altitudes. All in all the new Bell fighter is one of the greatest military ships in the world today. It is certain to make a fine showing at Wright Field when it undergoes test by the Material Division and will mean that the Army will have to plan new tactics for that type of plane. Not only would it make a good fighter but it could also be used for attack work, having been designed to carry several bombs in its "belly."

Congratulations should also go to the Allison concern, a General Motors outfit, for the design of such a wonderful engine after five years of development work. Incidentally the Allison Company threatens Pratt & Whitney's and Wright's reign as high-horsepower engine builders.

Another type of plane which the Bell may have to contend with in combat is the new Sikorsky that is being rushed to completion, perhaps at this reading it may be taking its maiden flight. It is the last word in Navy patrol boats and is literally cluttered with machine-gun nests from stem to stern. Four 1,000 h.p. plus engines (Pratt & Whitney Twin Rows) power the 25-ton monster. The battle plane is an offspring of the famous Sikorsky clippers with many refinements and larger proportions.

It exceeds the weight of the Clippers by some five to six tons. The wing is all-metal and cantilever, fairing into the top of the hull. The ship is known as the XPBS and will have a cruising range of more than 3,000 miles. The mock up alone took six months to build, was constructed of wood and fabric, and was complete to the most minute detail. Every important part was static tested to destruction. The armament on board consists of bow, center, and rear gun turrets. Like the Boeing XB-15 a 110 volt electrical system is also included.

Another news items which concerns abominably large things is that, in spite of all the disasters, the dirigible is still pleading for its life down in Washington. Rear Admiral Arthur B. Cook has requested that three of the largest dirigibles ever built be constructed immediately for use by the Navy. The lighter than air craft would be used to carry several large bombing planes.

The "war" at Cleveland this year known as the National Air Races always makes good reading material, but we will go into more detail of that circus next month as this issue unfortunately went to press before they occurred. Following is some dope on the racers however. Bill Schoenfeldt's racer is the Kieth Rider flown by Roger Don Rae last year. It has had its wing clipped and more horsepower is in the nose. Earl Ortman's Kieth Rider has had its wing, tail and engine changed or in other

AVIATION—"Looking Over Aviation with Captain Eddie Rickenbacker" is a September issue feature article. You can imagine how good it must be! If your newsdealer hasn't a copy of the September issue of BOYS' LIFE, then send 10c in stamps to BOYS' LIFE, 2 Park Avenue, New York, N.Y., and a copy will be mailed to you at once.

words is almost a completely new airplane. Both of Roscoe Turner's airplanes were revamped by Mattie Laird. Frank Fuller's job is a standard Seversky pursuit except for minor modifications for racing purposes. The Flagg Special was built by the employees of the Consolidated Aircraft Corp. and has a wingspread of only 14½ ft.

In the sportplane field there is much activity. At the Pasadena Junior College in California a new airplane is about to be put through its first test flights. It is a low-wing all-metal monoplane that seats four and is powered by a Warner engine. It will be competition for Cessna. It is of course a cabin job with retractable landing gear and has a gross weight of about 2500 pounds.

Ryan as we have mentioned briefly before has been working on a new low-wing airplane at Lindbergh Field. It has been a very conspicuous ship there for some time while undergoing tests. Three people may be carried with either a Menasco or Warner engine in the nose. Construction is all-metal with a cantilever wing.

Still another airplane in the same class is the all-metal T-5 Boeing being constructed by students of the Boeing School of Aeronautics. This too is a low-wing, cabin monoplane with cantilever wing and tail surfaces.

Bill Ong, noted race pilot, is said to have a ship of his own near the completion stage. Both the Delgado Central Trades School who built a racer a few years ago and the Collier Consolidated Aircraft Corporation of Tulsa, Oklahoma, are building new airplanes to be powered by Menasco engines.

The Crusader Aircraft Company is considering building a light trainer in order to increase finances to complete a twin-engined plane.

In Great Britain Mr. DeHavilland has been flying about in a new low-wing sport plane recently built by him and in Germany Dornier has built a large twin-engined high-wing bomber of graceful lines. The pilot sits in a cabin in the nose of the long slim fuselage. The tail is of the double-rudder type. As on the new French pursuit plane described later in this article the wing fillet is very large at the leading edge and apparently brings good results in streamlining. Wing flaps are employed. Even though it is a fine airplane we still think our new Douglas bombers could fly rings around it.

The twin-engined German Arado AR-77 trainer has been completed and has a promising appearance. The engines are 240 hp. Arguses located in nacelles that fair into the bottom of the wing. The nacelles are circular in shape, and from them protrude the rigid, well streamlined single-strut landing gear.

Since the Paris Aero Show things seem to be at a lull abroad. England has been producing some excellent new airplanes but on the whole there is nothing abroad to get overwhelmingly enthused about. We have heard much about the wonderful things Germany has been doing for the past two years and as yet there have been no results. Italy and France rallied for awhile and showed signs of regaining consciousness but it seems that they are back in a coma again, going 'round and 'round, building all sorts of foolish-looking military airplanes of the most ancient construction and design. All the countries are overloading themselves with military ships of rank performance. The answer is that they just cannot build good airplanes consistently. We must emphasize the word "consistently," however, as occasionally there are some good ships along with the concoctions, for we have in mind the new Heinkel German pursuit and a Loiré-Nieuport pursuit developed in France some months ago. Though not overwhelmingly abundant in horsepower the new single-seat low-wing Heinkel is one of the sleekest looking airplanes we have ever seen. We will make it a point to bring you the full particulars of this ship at a very early date. It is the swiftest airplane developed abroad since England's Hawker Hurricane.

It seems that some day somebody, somehow is going to design a craft that will actually go straight up and down consistently. Ever since man learned how to shave he has been endeavoring to create a successful helicopter. But now it seems that the helicopter has gained a more substantial place in aeronautics than being a laughing matter for the Focke-Wulf Company of Germany has built one with two sets of three-bladed propellers that have pulled it up to a height of 8,200 feet and a duration of one hour and twenty minutes to set a new record for that type of craft. It will do about 80 m.p.h. The ship has a tricycle landing gear and the fuselage is of the autogyro type with a 160 hp. Bramo engine in the nose that drives the rotors located on steel tube trussing, one on each side of the fuselage.

The Lockheed 14 has been test flown and lived up to expectations remarkably well. The new Fowler flaps are one of the most outstanding features of the ship and were responsible in giving the Model 14 a landing speed of as low as 47 m.p.h. in the first test flights with a light load.

Also in the test flight category is the under part of the Mayo composite aircraft. It looks much like the Short Empire flying boats except for innovations in the hull design.

### How to Build a Model of the Loire-Nieuport 250 Pursuit Plane

The Loiré-Nieuport 250 is one of France's foremost fighting planes. Its performance is very good and one novel feature of the ship is the double ailerons. Apparently the outboard ailerons operate at greater angles than the inboard ones and give smoother flying characteristics in turn. All-metal construction is employed with flush rivets. Its 14-cylinder Hispano engine turns an American Hamilton controllable pitch prop, so the French will have to be on our side again in the next war.

The more experience one has in building scale models the better one can build them. For beginners and those with experience alike the Loiré-Nieuport is a good ship to build because it has very simple, smooth

lines and yet much detail may be put into the model. The most important thing in building a model is to be accurate. Follow plans and instructions closely, and as a result you will have a fine appearing model of one of France's super-pursuit planes.

Make the entire model of balsa wood and join all parts with model cement, which may be purchased from almost any of the advertisers in this publication. Make the fuselage first. Draw the top view on stock with the grain of the wood running lengthwise and cut with a jig-saw leaving about a ⅛ margin around the outline. Then draw on the side view and cut again. Using a small sharp chisel shave down the top and sides to the outline. Then shave down the corners and give the fuselage the correct contours as shown by the cross-section. Go over the surfaces with coarse sandpaper to smooth out all rough spots and then use fine sandpaper to give a very smooth surface.

Use the same procedure in making the wing and tail units. The wing should be made in four sections, the two center sections that will be joined to the fuselage later and the two outboard panels that will give the wing its dihedral. The tail may most easily be formed with a sharp razor blade. Be sure the grain of the wood is always running lengthwise. Sandpaper the parts thoroughly.

Shape out the landing gear fairings from sheet balsa and the struts and tail skid. The two landing gear forks may be made by cementing three pieces of balsa in the shape shown in front view. It might be best to purchase the wheels.

The three-bladed propeller is most easily made by cutting out three blades from sheet balsa and joining them to a spinner also fashioned from wood.

Begin the assembly next. Lay the fuselage in flying position on a level surface and cement the center wing sections in place. Join the tail units to the tail of the fuselage and when they have dried join the two outboard wing panels. Put blocks under the tips to give them the correct dihedral angle as shown in front view. When all joints have dried thoroughly, turn the model on its back and install the landing gear. A small straight pin may act as an axle. Use a straight pin also in joining the prop to the nose. Go over all joints once more with cement and then sandpaper the entire model once more. Connect the two tail struts made from scrap wood and then begin the paint job. The entire model should be painted silver with red, white and blue stripes on the rudder. The windows in the cockpit enclosure should be white and all other trimmings black. You may go into such detail as your skill and experience permits. Many coats will have to be applied before a smooth finish is obtained. Your model will then be completed.

SUBSCRIBERS. Moving? If so be sure and inform us of your new address *5 weeks in advance.*



## How to Build a Pee Wee Gas Model

*(Continued from page 35)*

sounds obvious but consider it for a few moments. Did you ever hear of anyone skimping on glue or cutting holes and scallops in the longerons of a ten foot gas job? You didn't, and if your 44 inch gas job is going to be successful, no one will be able to say that you lightened it up in this manner. By making believe that your job is only an exaggerated rubber-powered model, you not only leave the job open to a major structural disaster, you are just begging for the opportunity to see a fine-looking ship slowly go to pieces before your eyes; a process which is impossible to stop. Of course the model must be kept reasonably light. This is accomplished by using medium outdoor stock throughout (the kind you would use on an outdoor weight rule model) except where otherwise specified. The sizes of the balsa used in this model are sufficiently large to permit this.

The fuselage framework is built of 3/16 square medium hard stock and all joints receive an extra coating of glue for strength. Pay special care to the alignment of the various members in the fuselage, as all settings are based on the fuselage framework. When the framework is completed, cut the two motor mount bulkheads labeled No. 3 and No. 4 out of 1/32 thick birch plywood or its equivalent in hard balsa, and glue them securely in place with cement. These two bulkheads hold the motor runners in place and also provide a secure base for the landing gear as well as strengthening the fuselage in cross section. The motor runners are next secured in place. If the bulkheads are plywood, these tapered bass strips are glued with casein glue. The cowl for the inverted Elf engine which is used on this ship, is built up around the motor mount. The first step is to cement the two balsa bulkheads labeled No. 1 and No. 2 in place and to cover them with soft 1/16 sheet balsa. Then cut out pattern No. 5 in soft 1/16 sheet balsa, bending it in place as shown, securely cementing it down. Then temporarily attach the rough blank of the hinged engine cover in place, and when dry, sand and cut it down so that it follows the lines of the fuselage and yet can fully enclose the motor. Pry it off and cover it with a good grade of silk, not necessarily the lightest available, using cement. Hollow it out carefully and replace it on the hinges that are used throughout on this model, the wire and tubing type. Be sure to place the hinges in the correct positions. Exactly the same procedure is followed in building the "trouble door" at the bottom of the cowl. When the entire cowl is assembled and covered with silk, it will look very realistic and yet offer easy access to the motor; an important feature when flying in very cold or warm weather. (Ask the man who owns one!) It is assumed that when the fuselage sides were still pinned down to the plans, you installed the tail mount. If you have, the next step is to mount a solid landing gear and tail skid into your plane. The landing gear wires are bent from 1/16 round piano wire to the exact size shown and are bound to 3/16 square balsa strips which are in turn lashed and cemented to the fuselage framework and bulkheads. No shock travel is provided for in this small gas job landing gear and performance proved that there was no necessity for it. The junction of the three landing gear wires near the wheel is firmly wrapped with 1/8 flat rubber and shellacked and painted over to prevent oil and greese from reaching it. In spite of these precautions, the best rubber grows rotten after a while, and must be replaced. The same precaution applies to the rubber band that holds the trouble door in place. The last thing to be done before the fuselage is covered is to build in a firm, tight battery box and to install the wiring circuit. It is also best to put the windshield and windows in place before covering.

The fuselage is covered with a good grade of light bamboo paper. The covering is tightened with water and a thin coat of dope is applied and sanded over when dry with ten-nought sandpaper. Two thin coats of colored dope completes the job. The windshield outline as well as separations between colors should be traced with 3/16 wide black tissue strips that are doped on. The best wheels for this gas job are air wheels of a 2 5/8" to a 3" diameter, which are slipped on to the axles and are held in place with rubber bound on the ends of the axle. If you were careful in building and coloring the fuselage, and if your cowl has been accurately made to expose only the prop and speed controls, your S-3 won't have to be ashamed of itself in any company.

### Wing

All the spars in the wing are very generously sized, and medium balsa will give it an ample safety factor. The main spar used in this wing is the super-strong box type, but it is fairly light. Its construction is quite simple, being no more nor less than two 1/16 sheet balsa side-plates separated at top and bottom by two 1/16 x ⅛ balsa strips. This spar is built up before the rest of the wing is attempted and is left to dry while the ribs and tips are being cut. The rib section, the R.A.F. 32, is cut 18 times in 1/16 soft sheet balsa, and the tips are cut from 3/16 medium balsa stock. When the leading and trailing edges have been cut, shaped and sanded, the work of assembling the wing takes place, one half at a time. In this process, the ribs are first glued on to the spar, then the leading and trailing edges are attached, the tips are added and shaped, and the small spars for the support of the sheet balsa leading edge, as well as the edge itself, are added to the wing structure. This sheet edge is made of very soft 1/16 sheet balsa and goes on very easily when held in place with pins. When all the joints are dry, the entire wing is sanded carefully and thoroughly, and the final checkup of the joints takes place. The wing is covered and finished like the fuselage and should not weigh more than two ounces when completed. The gas tank for the Elf engine is mounted in the wing and connects to the float chamber with a flexible rubber tubing than can be clamped to restrict the engine run to 45 seconds. The wing contains 275 square in. of area.

### Tail

The tail is highly tapered and looks very fine when mounted on the fuselage; it is efficient as well. The stabilizer is built up around an ⅛ square spar, and with the exception of this member, it is made of very soft balsa. Rectangles made of 1/16 sheet balsa measuring ⅝" deep and the length of the ribs they represent are slipped onto the spar in their respective positions and glued. The leading and the trailing edges are added next and the ribs are trimmed to streamline shape. When this has been done, the stabilizer is pinned to the plans and the tips and other spars are added. Lastly comes the sheet balsa leading edge and center section and the final careful sanding of the framework. The construction of the rudder is very similar to that of the stabilizer, except that it lacks a spar in the center. The tail is covered and finished like the wing, and like the wing, great care must be taken to forestall any tendency to warping. When the tissue is tightening on the evaporation of water that was sprayed on, most warps occur. To prevent them at this stage, weight the surfaces down to a flat board with books, flatirons, or anything that is handy. The finished and painted stabilizer is slipped into its position in the tail mount and securely cemented into place. The same goes for the rudder, and as a final touch, fillets are worked around the junctures of tail surfaces and fuselage. Make these of strips of bamboo paper in successively graduated widths. Starting with the smallest, these are cemented in place and smoothed down with a finger. (This method was originated by Ted Foti.) Do not forget to add a piece of soft 1/16 sheet balsa to the trailing edge of the rudder as shown. This little flap comes in very handy later on in adjusting the plane. Color the wings and tail to contrast with the fuselage. On the original S-3, the fuselage was light blue and the wings and tail orange; a very effective and visible combination.

### Miscellaneous

As was suggested before, install the wiring circuit and the battery box before covering the fuselage. If you have made up your mind to be extremely painstaking and meticulous in building any part of your gas job, choose the wiring circuit as the object of your labor. (That is unless you actually enjoy cranking an engine for hours provoking occasional pops.) Use a good grade of wire, such as Packard ignition wire, and make clean soldered joints wherever possible. Strive for a wiring circuit that is as much a part of your gas job as the longerons in the fuselage are. This type of a setup, along with the large door in the side of the fuselage will settle your ignition troubles for all time. A

twelve inch prop is used on this model. It is made of basswood and follows the blank outline shown on the plans. This outline need not be rigorously adhered to, but use approximately the same area on your prop. It must be, of course, statically as well as dynamically balanced. Don't spoil a good job with a rough and pitted finish. Finish this prop as you would a large rubber-powered prop; with dope, shellac and fine sandpaper. Do not be discouraged from spending several hours just making one prop by the thought that it will soon be shattered in a rough landing. These small gas jobs seem to be very easy on props; we used the same prop on all three shrimpos. Those of you who are familiar with the subject of mechanics should be able to relate this fact to moments of forces and solve this phenomenon quite easily. There is a good physical explanation for the fact that one of our models glided head-on into a baseball backstop only nicking the prop slightly.

There are many ways to test a gas job. There is only one best way. Here it is. Take the assembled plane, ready for powered flight, to the top of a moderate slope. Before letting her take to the air for the first time, be sure it balances longitudinally when suspended at the wing tips at a point 1/3 back from the leading edge. Shift the wing or the battery box, or both, to secure balance. Then, heading the model into the wind, give it a gentle shove down the hill. Keep this up until you can have the model just lift off the ground and barely skim along for ten to twenty feet, depending on the steepness of the hill. On these first test glides strive for a fast, level glide that is as nearly straight as poissible. *The model must not show the slightest tendency to stall!* When this adjustment is reached, set the model down in a large clearing and start the engine. At this point instructions have to cease, for your conduct in the next minute or so is purely a personal matter. Some fellows will stumble along with their eyes glued to the model, oblivious of trees, bystanders or baseballs, and shout instruction and comment to what they soon discover is a somewhat deaf model. I know, because that is what I do. However, when a sensible gas-jobber testflies his model, he loses all personal feelings as soon as the wheels leave the ground, and retains but a faint academic interest in the proceedings. The latter method allows the builder to devote all his attention to the performance of his model, and his subsequent adjustments can be much finer. As a final bit of advice, remember that your gas job is a sensitive, finely balanced machine, and it must be treated as such. Do not harm the future of gas job building with careless, sloppy flying. We suggest that you register your model with the I.G.M.A.A. as soon as it is completed.

Lots of luck and many happy landings!



## N. A. Junior News

*(Continued from page 25)*

cluded Wm. Thompson and Fred Parks of Parks Air College, Contest Director Bob Sommers, J. Walter Goldstein of Stix, Baer & Fuller and John Jacobsmeyer of the Aeronautical Department of the Chamber of Commerce.

### Junior Aviator National Air Races

Surpassing in magnificence, completeness of arrangements, events and prizes the other meets, was the fourth Scripps-Howard Junior National Air Race, held in Akron August 30 to September 2. The contest will long remain in the memories of all participants as the outstanding model classic in the Middle west.

Akron greeted Junior Aviator Champions with decorated and bannered streets. An air show, on Sunday August 30th, which thrilled 140,000 spectators and was surpassed only by the Cleveland Air races, started off the busy program of contests and fun. Bernarr Anderson won the gas model plane exhibition contest which was held during the air show.

On Monday, Champions from 17 Junior Aviator cities and other Junior Aviators who came at their own expense from far and near, competed in the Thompson Trophy Race for speed models over an 88 foot course and in the Original Design Event for the L. W. Greve Trophy.

Though one contestant, in an unofficial flight, reached a speed of 75 m.p.h., Richard Korda, present holder of the speed record, led the field with 70:83 m.p.h. Mike Karlak and Donald Buchele tied for second with 66:66 m.p.h. while Fred Mayfield and Leonard Becker tied for third place with 63:33 m.p.h. James McCoy came in fourth with a mere 60 m.p.h. The astonishing speeds reached by the Junior Aviators are not surprising to those who were aware of the work being done by this group. Especially the Lakewood Speed Foundation of Cleveland which has been fostering model aircraft racing for a good many years.

In the Original design event Albert Broz won the Greve Trophy with a pusher tractor design for a racing plane. Hilary Kosicki won second place with his heligyro creation. Third place went to William Gasky for his ornithopter design. The most spectacular flight of the day was one made by a rocket plane entered by Mike Karlak. His ship shot up to an altitude of 500 feet with the speed of a bullet and crashed to the ground when the rockets were spent. The judges' committee for this event was composed of Dr. Theodore Troller, head of the Guggenheim Airship Institute, B. E. Fulton, Akron Airport Manager and Rudolph Van Devere, Manager of Akron Airways.

On Tuesday the contestants again met on the field of battle in the shade of the huge Goodyear Zeppelin Hangar to compete in the stick model events.

Jerry Kolb of Cleveland established a new senior N.A.A. record and won the United Air Lines Trophy with an out of sight flight of 41 min. 15 sec. Kolb's model flew nearly 8 miles from the airport and was lost from sight by officials in a pursuit car only because of heavy traffic. Second and third places were won by Albert Broz

and Mike Karlak both of Cleveland with flights of 31 min. 55 sec. and 24 min. 10 sec. James Thames of Pittsburgh placed fourth with a flight of 21 min. and John Kuharski of Akron placed fifth with a 15 min. 6 sec.

Henry Falkowski of Buffalo won first place in the Junior Division, the Goodyear Trophy, when his stick model flew for 3 min. 41 sec. Chas. Baker of St. Catherine, Ontario placed 2nd and Wesley Perers, Akron, third with flights of 3 min. 25 sec. and 3 min. 20 sec. respectively. Eddie Voorhees, Akron placed fourth with 3 min. 6 sec. and James McCoy, Verona, Pa., took fifth place with 1 min. 52 sec.

In the Open Division, Harry Walker of Cleveland set the second new N.A.A. record when his stick model flew 36 min. 38.4 sec. and got him the Firestone Trophy. Other winners in the open division of this event were George Geil, Cleveland 5 min. 44.5 sec., S. H. Macrum, Pittsburgh, 4 min. 32.5 sec., Richard Korda, Cleveland, 3 min., R. H. Koda, Akron 2 min. 37.2 sec.

A special event for baby stick models of not more than 50 square inches of wing area entered by flyers under 12 years of age was won by Dick Rouse of Cuyahoga Falls, with a flight of 10 min. 30 sec. and got him the H. J. Heinz Trophy. Richard Falkowski, Buffalo, took second honors with 5 min. 31 sec. Samuel Scuro, Pittsburgh, Richard Kosicki, Cleveland and Macy Hallock, Medina, Ohio, placed third, fourth and fifth with the following duration: 2 min. 30 sec., 40 sec. and 38 sec. A splash party at the Akron YMCA rounded out the day's program.

By far the most popular, drawing most entries, was the gas power model event proving conclusively that interest in this type of model is still skyrocketing to greater heights.

Don Orman of Akron won first place in the senior division, the Stinson Trophy with a flight of 16 min. 31 sec. Donald Bushele of Toledo placed second and Carroll Krupp of Akron won third with flights of 11 min. 47.6 sec., 11 min. 31 sec. Fourth and fifth place were won by Edgar Everhart of Tallmadge with a flight of 9 min. 30 sec., and Clement Turansky of Cambridge, Pa., 9 min. 20.2 sec.

William Bernstein of Youngstown placed first in the open division and won the Texaco Trophy with a flight of 22 min. 30 sec. Richard Staab and Bernarr Anderson placed second and third with flights of 21 min. 23 sec., 20 min. 11 sec. E. L. Craig of Kent, Ohio, placed fourth with a flight of 16 min. 13.2 sec. and Richard Korda of Cleveland 14 min. 0.4 sec. Max Sokol of Detroit won the exhibition scale model contest and the Sperry Trophy with his Stinson Reliant model. Harry Walker was second with his Boeing F4B4 and Peter Zaleski was third with his Macon Fighter. M. B. Kleckner placed fourth with his Time Flies and Carroll Krupp fifth with his Fairchild 34.

In order to encourage better appearance and finish in model planes, four very fine stop-watches were awarded in different events by Berry Bros. makers of aircraft and model finishes.

Marge Lanzo, the only girl entrant in the contest, won the Berryloid award in the Stick Event. Paul Gustafson of Columbus won the Berryloid award in the Fuselage event. Gene Edmonds of Washington, Pa., won the Gas event and M. B. Klechner of Akron won the Scale event finish prizes.

After the cabin event the winners were taken to Cleveland where they were to be guests of honor at the Famous Flyers Luncheon where they received their prizes. Harry Walker, 23, of Cleveland received the Silver Al Williams Trophy as the Outstanding Junior Aviator while Clem Turansky, 19, of Pittsburgh received the "All American" Junior Aviator award given each year to the entrant winning the acclaim of his fellow competitors. Along with the handsome silver trophies winners of first, second and third place in each event received $15, $10 and $5 in cash. Later they attended the opening events of the Air Races, that day being dedicated to the Junior Aviators.

The contest was under the supervision of Ed Clark, National Junior Aviator Editor. H. M. Jellison was Contest Director and members of the Akron Women's N.A.A. Chapter together with a number of Junior Aviator Squadron Leaders from various cities acted as officials.

Regrettable was the absence of Major Al Williams, Junior Aviator Chief who, due to a knee injury was unable to attend, for the first time, the model meet. Major Al, who has the admiration and respect of all model builders holds the Junior Aviators organization close to his heart.

## Gas Lines

*(Continued from page 17)*

had little effect in this community. It appears that when people really want something they get it.

In picture No. 4 Cliff Cooper of 1923 South Sixth East, Salt Lake City, Utah, who is sixteen years old, is shown with his scale gas model Aeronca K. He says this is the first gas model he has built and it is a fine flier and very stable. He also tells us that it flies at about 30 m.p.h. at the high altitude of Salt Lake City. In normal altitudes the ship would probably fly in the neighborhood of 25 m.p.h. The model is built to a scale of about two inches to the foot, except the landing gear which is longer in order to give a sufficient prop clearance. The wing spread is six feet and it weighs three pounds. The model is powered by a Mighty Midget motor mounted on plywood. It took only one week to build this ship.

Cooper belongs to the Salt Lake City Gas Model Association. He wishes to know if anyone has built and flown an Aeronca K model.

A very neat gas model has been designed and built by Russell W. Smeed of Riverside Drive, Painesville, Ohio. It is shown in picture No. 5.

From what Smeed says in his letter he certainly proceeded in the proper manner when designing his ship. He first outlined the purposes of the ship and what objects should be attained. Briefly they are: moderate size, strong construction, stability and fair speed and climb with duration resulting largely from efficient placing of wings, tail, motor and streamlining rather than great soaring ability. Incidently, we might remark that such conditions will produce great soaring ability. An M.18 airfoil was used which produced a glide of about 13 or 14 to 1, for the little ship. General specifications are:

Weight with motor, three pounds; span, sixty-eight inches; chord, ten inches; length, forty-one inches; wing loading, 0.69 pounds per square foot. The motor is an inverted Baby Cyclone. Some of the features of the ship are:

Entirely external landing gear with minimum damage in case of washout. Struts hinged on pins with oleo shock absorbers. Wings fastened by pin and dowel method, dowels sliding in aluminum tubes extending through the fuselage. V struts hinged to wings and removed integrally with wing. Special gas tank to prevent "slopping" and insure feed in steep climbing attitudes. Flight timer made from wristwatch, weighing, with switch and removable fuselage panel, less than one ounce. Spark and throttle levers extend through front cowling. Entire cowl is left on for flight. Stabilizer mounted on fin by dowel and dural adjusting screw. Brace wires equipped with turnbuckles. Covering is all silk with aluminum and balsa cowling.

Howard J. Ide of 321 Cartlon Avenue S.E., Grand Rapids, Michigan, tells us that he recently completed his first gas model after one month of planning and two months of construction. This proportion of time for planning and construction appears to be a common experience. The ship is shown in picture No. 6. The name for this little ship which comes to our mind upon looking at its is "Snubby." However its owner calls it "Miss Chief." Without question it is a well designed and steady little job. It has a six foot span and is fifty inches long. The stabilizer area is about 28% of the wing area, and the fin area about 7%. A feature of the ship is that it may be completely dismantled in a very short time, the wing dividing into three sections. The rudder and stabilizer are removable, as well as the nose cowls, belly battery box and engine. The ship weighs 3¼ pounds ready to fly.

In picture No. 7 we see a rather unique plane, in fact the picture does not do it justice. Its builder, Mr. O. L. St. Clair of Yamkill, Oregon, Route 1, tells us that this plane may be controlled from the ground by going through the same motions as if you were in the cockpit of a large plane. He is a little mysterious as to how this is done and does not give us details. However, he tells us all control surfaces may be moved while the plane is in the air, including the throttle on the motor. This enables the pilot to take off and land the plane at will. He says:

"I had never flown a plane before taking this one off the ground, but the first flight was not as difficult as expected. Up to date I have flown it about three hours and no repairs have had to be made."

The control device costs very little to construct. The ship is powered with a Forster Brothers model A motor.

No doubt Mr. Smeed has whetted your curiosity, as he has your editor's. We hope he will see fit to throw further light on how he performs this remarkable feat without using radio control.

Models are flying in Australia. Proof of this is shown in picture No. 8, in which a great variety of this type of craft is displayed. The picture was taken at a recent contest of the Model Flying Club of Australia. Mr. Carter, the contest's general manager, is shown in the picture, the small cross being directly over his head.

One of the most unusual models that ever took off the ground is one which belongs to Mr. Kiewicz. Mr. Kiewicz is shown in picture No. 9 launching his model at the Scripps-Howard Junior Aviators Contest, recently held at Akron, Ohio. The wings of the ship are build exactly like birds' wings, as you can see. The dihedral is considerable on the inner panels but less on the outer ones. The front of the model is supported by only one wheel. However, it is held in an upright position when on the ground by the broad stabilizer at the rear. The fuselage is of monocoque design.

One of the most unusual and active clubs in the I.G.M.A.A. is the Quaker City Gas Model Airplane Club, composed of I.G.M.A.A., Units No. 6 and No. 15. The leaders of these units are Mr. Jesse Bieberman and Mr. William Berry, respectively. Most of the members live in northwest Philadelphia, Pa. Unit No. 15 is exceptional, inasmuch as it is almost entirely composed of fathers and sons, equally divided. This goes to show that older people are becoming interested in gas models as well as young men. These units "make it a business" to enter every meet in their vicinity. In order to facilitate transportation they have built a specially designed trailer which will carry fourteen planes.

Picture No. 10 shows the trailer with some of the planes in it. The canvas covering is stretched across the upper open side to keep out the weather.

Picture No. 11 shows a group of the members with some of the prizes won recently at the Allentown, Pa., Contest to which they journeyed from Philadelphia.

In the picture on the right is Mr. Berry, Sr., a gentleman well on in years and just as much interested in this sport as many of the younger men. He gets a great deal of enjoyment and health out of participating, he says.

Picture No. 12 shows the contestants who participated in the first gas model contest of the New Plymouth Model Aero Club, located at New Plymouth, New Zealand. Mr. Lawrence J. Starke writes and tells us that the club was formed three years ago and since its origin has grown to be the most active gas model club in that country. They hold the gas model record for their vicinity. Originally this club was started as a rubber model club. They have been active in gas model flying for only three months. He says:

"Three months ago there were no gas models in this town. At present we have ten models built or being built, and five engines among us.

"The big flight of the day at the first contest was made by J. Joll with his Loutrel Sportster, built from MODEL AIRPLANE NEWS plans. This was clocked out of sight at six minutes, twenty-four seconds; constituting a new New Zealand record. This does not seem much according to American standards, but considering there are few crossroads and models here have to be followed on foot, it appears very creditable.

"The record model is the one which appears in the center of the picture with the engine mounted on it."

John G. Pritchard of Bangor, Pa., who is unit leader of the Slate City Gas Model Association, an I.G.M.A.A. unit, writes and suggests that unit contests be held and for one unit to issue a challenge to another. This is a very excellent idea and may be carried out at any time by any unit. Mr. Pritchard says:

"If any unit wishes to have a contest with our unit, flights may be made near Slate City and we will provide the necessary equipment, such as stop-watches, etc."

Dr. Francis Spickerman of Suite 1104 Talcott Building, Rockford, Illinois, writes and tells us of a contest recently held at Machesney Airport in Rockford. There were 140 entries. The times were poor however because of a 20 to 25 mile wind. He says:

"The boys and spectators all had a very good time, nevertheless. The longest flight was 9 minutes, 40 seconds, made by Roy Marquardt of Burlington, Iowa. James Good of Beloit, Wisconsin, was second with 7 minutes, 39 seconds."

## Notices

We wish to make a correction. A statement was made in the September issue of MODEL AIRPLANE NEWS that Ray Landis of Philadelphia made a flight of 24 minutes, 20 seconds. This was an error. The flight was made by Jack Conine of 1012 Olney Avenue, Philadelphia, Pa.

Mr. J. C. Williams, secretary of the Gas Model Airplane Association of Southern California, of 6659 6th Avenue, Los Angeles, Calif., sends us the following report of this unit's activities:

We wish to inform you that the G.M.A.A.S.C. will have a contest on Sept. 19th for club members only. We believe that it will be quite a novel affair as it has never been tried before, at least not to our knowledge. The contestants will be devided into two groups. Each group to take the field for a specified time and each contestant to fly as he sees fit. The judges will pick five outstanding ships from each group. The ten ships picked will then be allowed one flight to determine the winners. It is rather unorthodox but should be lots of fun.

At our election last June the following members were elected to office:

Tom Truelson, President; Erl Harpe, Vice-President; J. C. Williams, Secretary; Grant Carder, Treasurer; Frank Knapton, Bud Warren and Herb Badstubner were elected to the board of directors.

Philip H. King, director of the Wachusett Model Aero Club, with headquarters at the Fitchburg, Y.M.C.A., Fitchburg, Mass., writes to say that he has been notified that a resident of Harvard, Mass., near Worcester, has found a gas model in his meadow and is holding it until he locates its owner. In two weeks he plans to turn it over to his nephew in Fitchburg to hold so that the owner can get it. If anyone knows of the gentleman who may own this model please notify Mr. King at the above address. The model is painted silver and is a high wing monoplane. It is powered with a Baby Cyclone engine.

Walter Seegmiller Jr., of 926 North Kentucky Avenue, Lakeland, Florida, writes that on the 18th of August a California Chief owned by Dale Williams of Lakeland, powered by a Brown Junior motor, was lost in the wooded area near

the Lakeland Haldeman-Elder airport. The plane was colored orange, blue and white and the motor number was B1711. A reward is offered for its return to Mr. Seegmiller.

Alfred Dohna of 71 Bradley Avenue, East Haven, Conn., a member of the East Haven Aero Club, I.G.M.A.A. Unit 55, says that recently at East Haven a model flew out of sight and was lost. He would greatly appreciate the return of this model if anyone in this vicinity finds it. A reward will be given. The owner of the model is Pat Angelo of 37 Boston Avenue, East Haven.

We have a very unusual letter from Claire Eldridge of 824 Agnes Avenue, El Monte, California. He says:

"We have an unorganized group of 'gas hounds' here in El Monte and just last Sunday we were talking about how long it would be before a long-haired someone would rise up and cry 'Down with these gas jobs!'

"Now your article sounds the alarm to all of us to 'gang up' and present a united front against such a calamity.

"We fly our ships at the Santa Anita Racetrack parking grounds and last week the superintendent and I were talking together. I asked him about the chance of us being put off the field and he remarked that there was not a chance of this, they were glad to have us there. However, here is the interesting part of the whole affair. While we were talking three young girls of 18 or 19 years, in a Ford coupe, took a zoom at my ship, throwing gravel all over the plane and us. This was repeated, and a third time we really unloaded a broadside. Rocks, gravel and a pair of pliers which nicked the paint on said coupe.

"So there you are—gas model builders are considered 'dangerous' and yet idiots of this sort in the coupe only needed a slight skid on the ground to smash up a lot of work to say nothing of personal injury."

## What Happened at the "Wakefields"

*(Continued from page 9)*

imaginary circle. It was close enough for the spectators yet it allowed the model to gain sufficient altitude to clear them by the time the wind drifted in. Two timers were assigned to each country so there was no lack of them. The flying order at the beginning was rather slow as only one ship flew at a time, but after lunch (thank you, Mrs. Truston), the flights were speeded up by allowing take-offs one after another. In such manner the contest was over before six o'clock with at least 120 flights reported. It might be mentioned that all flying was done under perfect conditions with slight breeze to drift the ships away and give the contestants some work. The thermals were not exactly numerous but there were many small ones which help considerably in bring the average the highest yet achieved in the Wakefield contests.

It is impossible to give description of each and every ship and take off. The American ships did have their characteristics of getting up into the blue in short time and then hunt for the thermal. It might be mentioned that Dick made a complete new job while he was in London as his other ship was damaged considerably in early trials. He certainly deserves a hand for showing such a good average with the ship that was tested that morning. The Continental and English models had almost as good a climb as ours but they had a much longer prop run to search for currents. Although some of the models could use a bit more power to get them over that initial hesitation. It is quite possible that we would have fared better if we had the other three official finalists as they were all good men known for their consistency. But let it be mentioned here that there was some fine flying done that day.

The surprise were the German models. We really did not expect them to be so smooth and stable and have such a long duration. This, though, was possibly due to the fact that we hear so little from Germany and when we do it is mostly about their model glider activities. All of their models were made of balsa and one or two also used synthetic rubber. Swedish and Norwegian designs were up to the minute which showed that they follow English and American trend. Some of the boys are still a bit shy on the finer points of flying, but considering their short time in the model game, they are doing splendidly. In all, we had better start to worry about holding our mythical lead in records.

The winning French model looked a bit under-powered according to our standards.

It does not have such a "whoomp" of a climb but it somehow keeps on going up. And if in the meantime a "bumper" comes along it will take it very nicely as it is of a comparatively clean aerodynamical design as shown by the photo. A complete description of this model will very likely appear in a later issue of the MODEL AIRPLANE NEWS. It is a design with several new features developed by Frenchmen. Mr. Fillon is well known in France and has won several contests so that it is not by a mere chance that he did win the Wakefield Trophy. That is one thing about this competition. It is won by someone who really does know what he is doing and not by pure and complete luck.

The contest itself progressed on in a very even tenor and nothing extraordinary or exciting happened which speaks well for the management. The polite reprimands from Mr. Smith over the loud speaker brought polite response from the spectators and contestants. So that the contest was over before we were aware of the fact. A bit of huddle and the winner was announced and with that the contest was officially over after three cheers were given for the Frenchmen.

Going back to London we were all like old friends talking the day over. In some corners the lads were already designing their new jobs and by use of sign language and sketches parted with their favorite gadgets. By now we all interchanged pins so that no one could tell who was who unless he knew by sight. Arriving at the Royal Aero Club we unloaded the boxes and had a deserved washing up, and then we were taken to what the English lads called a light snack. It actually turned out to be a minor banquet as we were just handed the menu with instructions to help ourselves. The writer was with the Frenchmen and he certainly enjoyed himself with this lively crowd, especially when ten o'clock struck, at which time the drinks were supposed to be cleared in restaurants. The Frenchmen did not exactly understand the procedure and tried to hide the beer, and the head waiter had to be polite after all, which added considerably to the zest of eating. The snack lasted for several hours until the place was almost empty and then we still gabbed outside, so that it was pretty late when we finally tumbled into bed on that memorable day.

August 2nd dawned to be another unusual day for London, with the sun actually shining. Today the Shelley Cup and Bowden International Trophy events were to take place. Herby Fish and Jessee Bieberman had gas jobs so that America was represented. Herby bought his machine from Carol Krupp, since purchased machines were allowed, and he did not have enough time to build one before the meet. Jessee practically made his on his way as he also did not have time, and at the same time it had to be of such design that it fitted somewhere in his car without taking up too much room. The two tested their models while the English event was on. Herbert's job was soon adjusted but Jessee had considerable trouble so that when the International event began he was too deep in repairs to enter it.

Sir John Shelley Cup competition for power driven models of any kind had a peculiar rule specification. The contestant declared just how long his model will remain in the air before releasing his machine. The winner was the one who came closest to his declared time. This seems to be a good stunt under English conditions where countryside is dotted with homes at every point. At the same time it is also a good indication of how well the builder knows his model. Although the power was optional only petrol models were entered. The models had definite English characteristics as shown by photos. To be frank, their machines were in general under better control than most of ours. This can be attributed to the fact that they fly with lower throttle, and mainly the builders are almost all grownups who know their jobs. The especially large landing gear far forward also helped considerably in take-offs since no help was permitted. The writer was impressed by the neatness in which the motors were kept, more like a piece of delicate machinery that it really is than just any old thing. We must keep in mind that a motor costs them about $30.00.

The contest progressed in orderly fashion with everything under control. At this time the crowd was stationed at a considerable distance from the activity center, so that it was very seldom that a model flew near them. The short-cropped grass helped considerably in preventing turnover and ground loops when the model touched the ground. It was surprising how close some of the models came to the specified time and how few models were damaged. The winner of the event was F. E. Nugent.

### Bowden International Gas Model Event

The Bowden Trophy was competed for by English, French and Americans. The contest rules specified that the winner would be declared on point system based on the controllability and stability of the model. The model to obtain full credit had to land between 45 and 90 seconds after the takeoff and land undamaged. Flights longer or shorter of this specification lost all the point of that flight, and minor damages of qualified flight deduct points from the total. The contest was worth while watching from beginning to end, and especially noting how the points worked out. Herbert's timers almost had a case of something or other just as dangerous when they clocked one of his flights to 89.5 seconds. You can just imagine their tension with the slow-gliding ship just about to land and the clock hand so close to the deadline. It is in cases like this that two timers prevent differences later.

With every contestant having three flights, the results were compared and it was found that four boys including Herbert were tied for the first place. They had another round and two fell short. So it finally had to be decided between Herbert and an Englishman. High tension and what not everywhere, but Herbert and the other lad were calm and collected as they sent off their ships. Herbert's model had a good climb and glide but it drifted over high grass which caused it to turn over, but nothing was damaged. The English machine was also under perfect control but

the landing was a bit too hard which sort of bent the landing wires into a "lying puppy" style, if you know what I mean. This minor incident was enough to give Herbert the needed lead. So close was the winning margin. We Americans naturally felt fine, at least having something to bring home. Although, if sponsors would realize it, the liberal education received by their proteges more than repays hem for their kindness. I am sure that all the boys will hold dear their benefactors as long as they can remember. It is not only the boy alone who receives the benefit but the Nation as a whole becomes more personified as being good to our foreign friends.

Back to London to dress up in your best for the banquet. On the way back the writer was told that he was expected to say a few words. Valla! (French, meaning "There!"). When we arrived at the Park Lake Hotel (the best in town, boys), the banquet was already in progress. Yours truly had the experience of being seated for the first time at the speakers' table while the rest of the group was close by.

It is rather difficult to describe the banquet itself as the mouth just begins to water and words fail. What else could you say except that we had melon, fish, broiled whole squash, roast, cake, ice cream, coffee if you wished, and cigars and cigarettes if you indulge in such coffin nails. And the mouth goes dry at the thought of champagne, and two kinds of wine with brandy thrown in for good measure. It was too bad the writer had to make his talk notes while eating or he would have been singing "Sweet Adeline" before the banquet was half way over. It was estimated that Lord Wakefield invited about 500 guests, and although it might not be fitting to mention costs, it can be safely stated that it must have been about a pound per guest. With eatables cleared and tobacco smoke rising up, the purpose of the event arrived.

First: Toast to "H. M. The King"! Then to the countries represented, Lord Wakefield, and competitors. Mr. Thurston ably acted as the master of ceremonies. Mrs. Thurston then presented the Wakefield Trophy to Mr. Fillon and Mrs. Bowden presented the Bowden Cup to Mr. Fish. Then the captains or the managers from each team were called upon for a few words. All expressed deepest gratitude to Lord Wakefield for making all this possible. And thanked the S.A.M.E. and its officers for such a splendid time. All promised to come to France in 1938 and in turn invited the other countries to their own international events. It does seem that this event will be the beginning of more international competitions. In all, the occasion will be remembered by all of us. If we would have traveled only for this event, it was worth the effect.

As all things must come to an end so did this banquet, but not before we had hearty laughs at the so-called dry English humor explained by one of the titled guests. The hour of midnight approached. The hall slowly cleared. We lingered on in the hall way and sidewalk so that it was past two before we turned in.

Next day, Aug. 3rd, we visited the Science Museum's aeronautical exhibit. A whole article could be written just on this as we saw most of the original models and aeroplanes which are mentioned in textbooks. We were especially fortunate in having Mr. Thurston as our personal guide since he was in the midst of all these experiments. He pointed out many ships which he helped to design. We had the extra privilege of actually handling any of the exhibits. Later on a side excursion brought us back to modern days by a complete exhibit of Television with actual demonstrations. By now it was six and we gathered like a brood of chicks and followed Mr. and Mrs. Thurston to another snack. Sunday the Belgium boys left; Tuesday, the Dutch; and now we said goodbye to the French. Then those of us who were left attended an ice carnival show at the Coliseum, which was especially appropriate for the international gathering since most of the acting was action or pantomime. After the show we had a tidbit and shook hands with Swedish and Norwegian lads. Slowly but surely the contesting body broke up. And so ended the official program for the 1937 Wakefield Competition held in London on August 1st.

On Wednesday morning the Germans left. We Americans stayed until Saturday morning. We saw all there was to see of London. Had tea and biscuits at all sorts of places. Saw the smart guards at the Buckingham palace and thoroughly enjoyed the record London heat. It will be hard to imagine London as being beshrouded in fog from now on. We scheduled our visit to Paris on Saturday. We started on time to arrive at the station at 10 a.m. And we did come a few minutes ahead, but we had about fifteen pieces of baggage, some of which had to be registered, and before we knew it the train left. So we had to change our tickets and wait until 2 p.m. before we finally departed from our good and generous English friends.

## CLASSIFIED DIRECTORY



## THANKS

On behalf of our American team and myself, I wish to thank you one and all who have worked so hard to make our stay in England so pleasant. We enjoyed ourselves immensely while with you and we shall always remember your generosity and hospitality. We wish to especially thank Lord Wakefield for his continuous interest in Model Aeronautics. And also to Mr. and Mrs. Thurston for devoting so much of their valuable time for us. A good long hand for Messrs. Harry York. J. C. Smith, E. F. M. Cosh and other officers of the S.A.M.E., who must have spent countless hours in our behalf. It has been nice meeting you chaps and you may be assured of a royal welcome when you come to our side of the pond. Until next year in Paris, Au Revoir!

RETIRED FROM CONTEST

De Boer, Holland
J. J. Haffey, Canada (T. Ive)s
T. W. Harker, S. Africa (G. J. Liggett)
A. Garvie, S. Africa (A. Judge)

ENTRIES

| | |
|---|---|
| France | 6 |
| America | 5 |
| Norway | 1 |
| Great Britain | 6 |
| Holland | 5 |
| Germany | 6 |
| Belgium | 3 |
| Sweden | 5 |
| South Africa | 4 |
| Canada | 3 |
| New Zealand | 4 |

## WAKEFIELD CUP RESULTS 1937

| | | | *Average* | *Proxy Flyer* |
|---|---|---|---|---|
| 1. | E. Fillon | France | 253.23 | |
| 2. | R. Bullock | Great Britain | 194.53 | |
| 3. | R. T. Howse | Great Britain | 193.46 | |
| 4. | Chabot | France | 157.6 | |
| 5. | R. Clasens | Belgium | 156.83 | |
| 6. | B. Anderson | Sweden | 155.73 | |
| 7. | M. Mckinney | Belgium | 155.05 | |
| 8. | G. Stark | Germany | 151.83 | |
| 9. | K. Schmidtberg | Germany | 147.65 | |
| 10. | A. Dague | America | 145.1 | |
| 11. | D. Bodle | America | 136.16 | |
| 12. | B. Lindn | Sweden | 132.73 | |
| 13. | A. Lippman | Germany | 122.1 | |
| 14. | Ducrot | France | 117.36 | |
| 15. | J. Leadbetter | Great Britain | 114.0 | |
| 16. | A. Palmgren | Sweden | 109.3 | |
| 17. | E. E. Olsen | Norway | 102.1 | |
| 18. | H. Fish | America | 86.5 | |
| 19. | Robert | France | 82.63 | |
| 20. | A. Van Wymerset | Belgium | 82.23 | |
| 21. | E. Wentzel | Sweden | 81.16 | |
| 22. | F. Zaic | America | 78.7 | |
| 23. | J. Worden | Great Britain | 74.0 | |
| 24. | W. G. Alexander | New Zealand | 71.3 | (R. Copland) |
| 25. | J. E. Adams | Canada | 70.083 | (C. S. Rushbrooke) |
| 26. | E. A. Davies | Great Britain | 68.13 | |
| 27. | E. Endean | South Africa | 65.73 | (S. R. Crow) |
| 28. | J. Lemick | Canada | 62.216 | (A. G. Newton) |
| 29. | G. Haase | Germany | 56.825 | |
| 30. | E. Klose | Germany | 51.783 | |
| 31. | P. Dalgety | South Africa | 51.36 | (E. W. Evans) |
| 32. | A. Menzel | Germany | 50.216 | |
| 33. | P. Armes | Germany | 49.96 | |
| 34. | Blanchet | France | 43.56 | |
| 35. | E. Chasteneuf | Great Britain | 38.93 | |
| 36. | Parker | New Zealand | 36.93 | (R. Bridgden) |
| 37. | H. Mosch | Holland | 35.1 | |
| 38. | H. Struck | America | 34.8 | (J. Bieberman) |
| 39. | J. Besemer | Holland | 26.25 | |
| 40. | H. Kerkhoff | Holland | 24.6 | |
| 41. | Desnoes | France | 19.0 | |
| 42. | T. Van Velsen | Holland | 16.9 | |
| 43. | G. Collier | New Zealand | 12.5 | (H. W. Bexley) |
| 44. | Wazoo, II | New Zealand | 11.46 | (C. Buffery) |

# The COMET GAS MODEL

## . . . Soaring far above all others in

- **FLYABILITY**
- **COMPLETENESS and**
- **FINISHED PARTS**

It took us two years to test and perfect the Comet Gas Model—but when we read the enthusiastic letters of the fellows who have built them, we aren't a bit sorry! It's way out in front when it comes to FLYABILITY, COMPLETENESS, FINISHED PARTS, EASE OF CONSTRUCTION, and VALUE. You'll never know all the thrills of building and flying a real Gas Model until you get the Comet Gas Model Kit! Send 3c stamp for sheet containing complete specifications, features and list of contents, as well as many accessories in addition to those listed below!

### SPECIFICATIONS

MODEL—Curtiss Robin
WINGSPAN—6 feet
OVERALL LENGTH—46"
WEIGHT OF MODEL—2 lbs. less motor
POWER—any 1/5th or 1/6th H.P. motor
WHEELS—3½ in. air wheels

### A SENSATIONAL VALUE

**$4.95** less airwheels and motor — **$6.50** with airwheels less motor

KIT—$2.50
BIG MONEY'S WORTH!

Postage—east of the Mississippi, 30c; west of the Mississippi, 50c; none if ordered from Comet Dealer.

Complete set of plans, all printed balsa sheets and die-cut ribs. Postage 20c; none if bought from dealer.

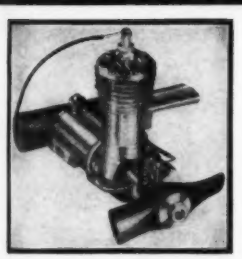
**FEATURES:** DETACHABLE wings and tail assembly. Wings "give" in event of collision, to protect them. ADJUSTABLE RUDDER and elevator setting. ADJUSTABLE MOTOR SKID accommodates practically every motor on market. Thrust line can be varied. SHOCK-ABSORBING LANDING gear and tail wheel—exclusive with Comet. Prolongs life of model by absorbing landing shocks. Monocoque type, used by newest transports, chosen because of light weight, structural strength, and ease of construction. CURTISS ROBIN chosen because of unusual inherent stability and excellent flyability. MOTOR SKID gives in event of collision—protecting motor. REMOVABLE COWL and hatches for easy accessibility to motor, battery and wing springs.

### COMET MODEL AIRPLANE & SUPPLY COMPANY

**3559 West Cermak Road, CHICAGO  Eastern Branch: 688 Broadway, NEW YORK**

COMET maintains distributors in many cities throughout the United States and other parts of the world. Foreign distributors include: F. P. Sweeten, Blackpool, England; R. W. Hill, Capetown, South Africa; E. J. Hyams and Son, Wellington, C. I., New Zealand; Swift Model Aircraft Co., Brisbane, Queensland, Australia. PACIFIC COAST DISTRIBUTOR: Edw. Kapitanoff, 4649 Prospect Ave., Los Angeles, Calif.

## QUALITY GAS MODEL MOTORS & ACCESSORIES



### GWIN-AEROMOTOR

Specifications: Flying weight complete with exception of battery, 12 oz. Bore, 13/16"—Stroke, 13/16". Speed range 500 to 7500 r.p.m. with design propeller. Power ⅛ h.p. Controllable spark adjustment. Price, complete with coil, tank, condenser, and instruction manual..... **$17.50**

### BROWN JR. MOTOR

Everyone familiar with motors knows the splendid record the Brown Jr. enjoys. Years of experience lie behind this product. Its merits are known to gas model enthusiasts the world over. Specifications: ⅞" bore x 1" stroke. 1200 to 10,000 r.p.m. Total weight but without battery, 1¾ oz. Complete as illustrated..... **$21.50**

### TERMINAL SPRING CLIPS

Only ⅜" long. Very light, excellent for motor connections, terminals, etc. Bright nickel finish..... 2 for 5c

### SENSATIONAL NEW SYNCRO ACE

A low priced, streamlined motor that's a real whiz! ⅓th H.P. motor; speed 500 to 10,000 r.p.m. Delco-Remy ignition. Champion spark plugs. Bore ⅞". Stroke 15/16". Improved timer, placed above oil and grime interference. Factory tested, mounted on skids. Less batteries and propeller..... **$15.00**

They're going fast. Order Now!


### BURGESS BATTERY

Outlasts, delivers a hotter spark, and weighs 1½ oz. less than flashlight cells. Easier to install because it is one unit and has terminal clips. Instant starting without aid of "boosters." Moisture proof and leak-proof..... **80c ea.**

### COMET AIR INFLATED BALLOON WHEELS

Will withstand the most severe punishment. Hubs are bronze bushed to fit ⅛" dia. axles. This prolongs life of wheels, makes them outlast many higher priced wheels. Hub is enameled, making a neat appearing unit. Pure rubber tires which maintain inflated pressure. Brings model down with a cushion-like action. 3½" dia. Only..... **$1.60 pr.**

### NEW STREAMLINED INFLATED WHEELS

Inflated by use of simple valve furnished with each pair. Sturdily designed to give maximum service. You will be proud to put a pair on your model—they're wonderful. 3½" diameter $1.50 pair, 4½" Dia..... **$1.75 pr.**

### IGNITION COIL

New light weight (only 2½ oz.) moulded extra strength bakelite enclosed coil. Clip terminals on primary and renewable high tension lead. Absolutely oil and waterproof. Coil is only 1" dia. and is 2" high. Will outlast many higher priced coils. A real classy looking unit. Coil, including high tension lead..... **$2.50 ea.**

### CONDENSER

Can be used for any motor on market. Multiple strand leads. Mounting bracket attached to condenser **25c each**

### FLIGHT TIMER

Adjustable from 0 to 60 seconds. Weighs only 2¼ oz. Silver contact on-off switch, snap action. A precision built unit. Will last a lifetime..... **$3.00 ea.**

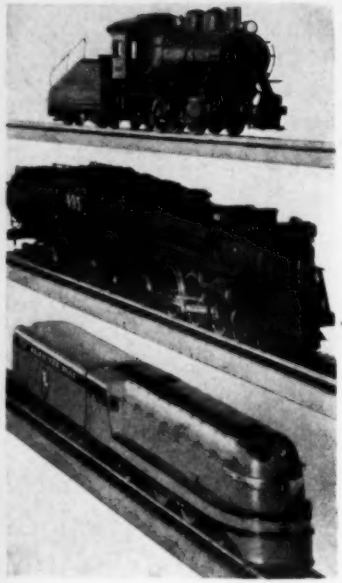
### ORDERING INSTRUCTIONS

Add to ALL orders an additional 15c to cover postage and packing charge. Remit by money orders only; you assume your own risk, if cash is sent. CANADA. Be sure to add an extra 15c in addition to the above. No postage charges if bought at your dealer.

### LUGS

These should be soldered to all wire terminals. Facilitates taking connections apart. Smallest ever made. One-half dozen in package for 5c.

# Start Your C-D



With long evenings coming, you've a lot of sport and fun just ahead—at little cost—building these interesting new C-D R.R. models. Try it! Even if you just use the finished models as ornaments for your mantel or bookcase, you'll never regret having tried your hand at this new C-D simplified system of building R.R. models. It's great fun—gives a variety to your model work that really peps it up—and, best of all, you're building honest-to-goodness models, which can later be converted by changing trucks and couplers to actual operating equipment. The Hiawatha Group of 4 Kits costs only $3.20—and it's easy to build. Why not start in with them—or, if you prefer, make your own selection, from the Kits listed here. Above all, remember C-D model railroading employs the best advantages of all other gages—is easier to build and costs only a fraction of other railroad Kits.

## Seven Star Features!

★ 1. All locomotive cabs, tender and cab sides, tops and ends as well as freight cars, completely printed out—lettering and all—in full realistic colors, where possible (roofs of Hiawatha train must be painted gray because of their more or less intricate designs even though all are simply made).

★ 2. Wheels supplied turned, requiring only hand work to complete. They all roll, with movable locomotive mechanisms.

★ 3. Necessary locomotive "mechanism," bulkheads, walks, truck side frames, etc., printed out.

★ 4. All necessary strips, blocks and pieces to complete the entire locomotive tenders or cars.

★ 5. All fill in materials to realistically simulate the metal or solid wood construction as it appears on the prototype.

★ 6. All wire, special printed, lettered and detailed covering paper, screws, escutcheon pins, axles included, etc., etc., etc.

★ 7. And last, but most important of all, included in each Kit is a completely detailed full sized, copyrighted authentic Rep drawing, enabling you to make each model most easily by the easy model design methods worked out—far more easily made than might be believed.

**BIG CATALOG**
**WITH VERY LARGE SUPPLEMENT**
**15c FOR BOTH**

Don't fail to send for biggest American model-making catalog and supplement ever offered. Thousands of tiny items never before available from a single source. Over a hundred C-D flying model airplane kits, all the RR. kits and dozens and dozens of other types of kits available. Mail 15c for both of these immediately. Over 5500 kits and parts.

### *Don't Wait—Order Some Kits Today!*

By all means, build a few of these C-D R.R. models. You'll find them intensely fascinating in the realistic construction, and the finished models will be a real source of pride to you. Moreover, it won't take you long to build any of these models—and the cost is ridiculously low. See your dealer—or order direct.

## 34 Kits Ready!

***All Designed to Cleveland's New 3/16" Scale and 1/2" Gage***

**Average over all sizes, Locomotives, 12"-17"; Passenger Cars, 15"; Box Cars, 8"; height, 2½".**

| | | |
|---|---|---|
| RL-1 | PRR Switcher 0-6-0 and Tender | $ .65 |
| RL-2 | C&O Pacific (4-6-2) Locomotive and Tender | .85 |
| RS-1 | Hiawatha (4-4-2) Locomotive and Tender | .95 |
| RS-2 | Hiawatha Tap-Dinner Car | .75 |
| RS-3 | Hiawatha Coach | .75 |
| RS-4 | Hiawatha Beaver Tail Car | .75 |
| | **BOX CARS** | |
| RB-1 | NYC—40 ft. steel (NYC Herald) | .45 |
| RB-2 | B&O—40 ft. steel | .45 |
| RB-3 | B&O—40 ft. wood | .45 |
| RB-4 | Rock Island—40 ft. wood | .45 |
| RB-5 | Wabash—40 ft. wood | .45 |
| RB-6 | Southern Pac.—40 ft. wood furn. car (SP Herald) | .45 |
| RB-7 | (Discontinued) | |
| RB-8 | Texas & Pac.—40 ft. wood auto | .45 |
| RB-9 | AT&SF—40 ft wood (Santa Fe Herald) | .45 |
| RB-10 | (Discontinued) | |
| RB-11 | Union Pac.—50 ft. steel | .55 |
| RB-12 | AT&SF—50 ft. steel auto (Santa Fe Herald) | .55 |
| | **CABOOSE** | |
| RC-1 | PRR type N-5 | .45 |
| | **GONDOLA TYPE CARS** | |
| RG-1 | L&N—41 ft.—50 ton. Class G.A. | .35 |
| RG-2 | NYC—41 ft.—50 ton black, Class G.A. (NYC Herald) | .35 |
| RG-3 | MC—41 ft.—55 ton. Class G.A. (NYC Herald) | .35 |
| RG-4 | T&P—41 ft.—50 ton. ClassG.A. | .35 |
| RG-5 | PRR—65 ft.—70 ton, Mill Gondola. Class G.M. (PRR Herald) | .55 |
| | **FLAT CARS** | |
| RF-1 | C&NW—46 ft.—50 ton | .25 |
| RF-2 | PRR—46 ft.—50 ton | .25 |
| RF-3 | B&M—46 ft.—55 ton | .25 |
| RF-4 | L&N—46 ft.—50 ton | .25 |
| | **HOPPER TYPE CARS** | |
| RH-1 | CCC&StL—55 ton, Twin Hopper, Class HM (NYC Herald) | .40 |
| RH-2 | MP—55 ton, Twin Hopper, Class HM (MP Herald) | .40 |
| RH-3 | Southern—55 ton, Twin Hopper, Class HM | .40 |
| RH-4 | Illinois Central—50 ton, Twin Hopper, Class HM | .40 |
| | **TANK CARS** | |
| RT-1 | Texaco—TCX (white) 8,000 gal. | .35 |
| RT-2 | NATX (black) 8,000 gal. | .35 |
| RT-3 | Sinclair—SDRX (black) 8,000 gal. | .35 |
| RT-4 | Gulf—GRCX (black) 8,000 gal. | .35 |

These Kits are all dry—no cements or colors are included with them. The models they build are known as Representative (Rep) models. In the Fall, we will start bringing out a line of "Super Models." By simply employing working couplers, detaching the dummy trucks, and replacing them with actual working trucks, all your "Rep" (cars only) models can be used on your "Super Model" layout. This line of models shall be known as the C-D DE LUXE LINE.

*Your Order Today!*

# Model R.R. Now

### ALL AIRPLANE TYPE CONSTRUCTION—SIMPLE TO MAKE—TRY THEM

These C-D Scale and Gage models show how beautifully all details may be incorporated—as easily as in larger scales—practically all advantages in layouts as in smaller gages. While all are "dummies" for "atmosphere," cars may be converted later to run on either 2- or 3-rail systems—for which we shall soon announce kits and parts—inexpensive trucks, couplers, etc. All super detailed.

***Read Before Ordering*** If your dealer can't supply you, order direct. All orders subject to our regular shipping terms. Send check or M. O. (cash at own risk). No C. O. D.'s. Canada, Mexico, British Isles, add 10% extra; all other countries, 20%.

*See our big ad on the Center pages!*

***Dealers!*** Write at once for biggest profit opportunity on Model Railroad Kits and Supplies ever offered. Very liberal discounts, and only small investment required. (Legitimate dealers only.) **European Dealers**—Write to H. Vilen, Nybrokajen 7, Stockholm C Sweden, our European distributor.

# CLEVELAND MODEL & SUPPLY Co., INC.

4508-A2E LODAIN AVENUE CLEVELAND OHIO U.S.A.

CLEVELAND MODEL

line of models shall be known as the C-D DE LUXE LINE.

Your Order Today!

& SUPPLY Co., INC.

AVENUE CLEVELAND OHIO U.S.A.